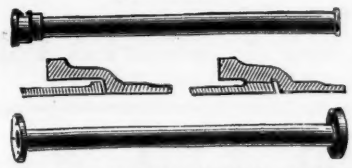
THE JOURNAL OF GAS LIGHTING
WATER SUPPLY & SANITARY IMPROVEMENT

VOL. LXXIII. No. 1869.] LONDON, MARCH 7, 1899. [51ST YEAR. PRICE 6d.

GAS AND WATER PIPES

1¼ to 12 IN. BORE.



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ESTABLISHED 1848.

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Maintains a High Standard in Residuals.

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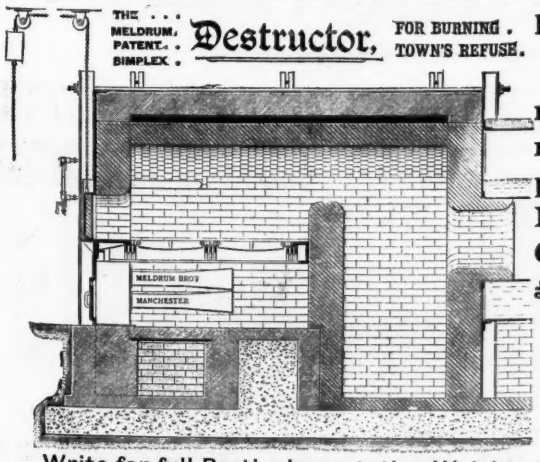
THE Utilization of Towns' Refuse for some practical purpose has been successfully solved; and there is, therefore, no reason why every township should not have its own Electric Light Installation, and obtain all the power from its Dust-Bins.



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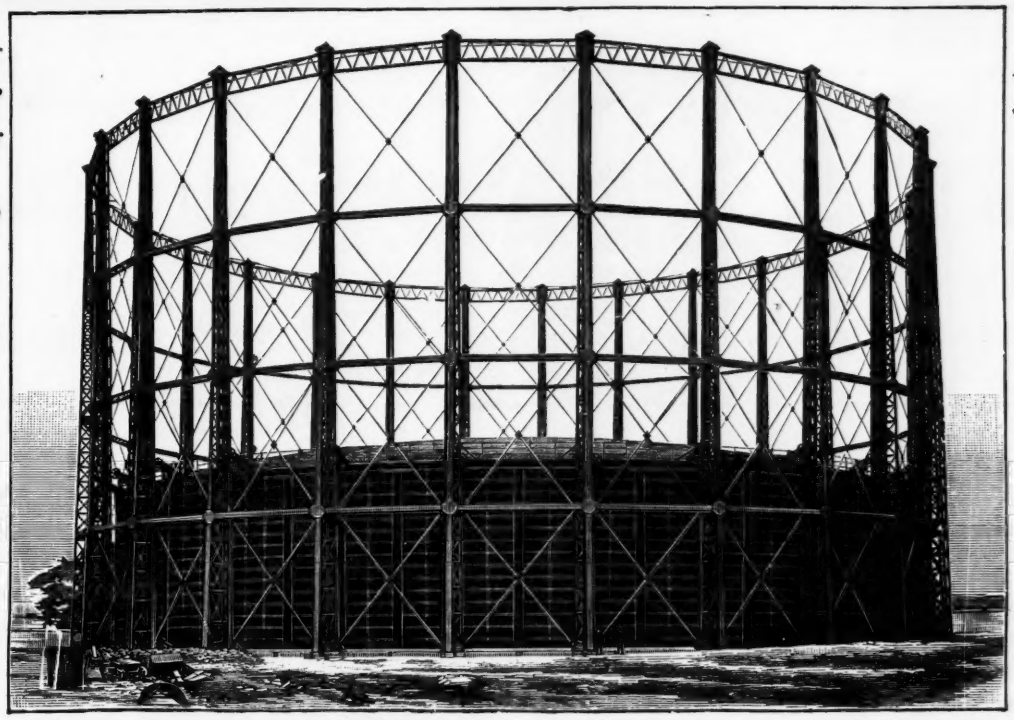

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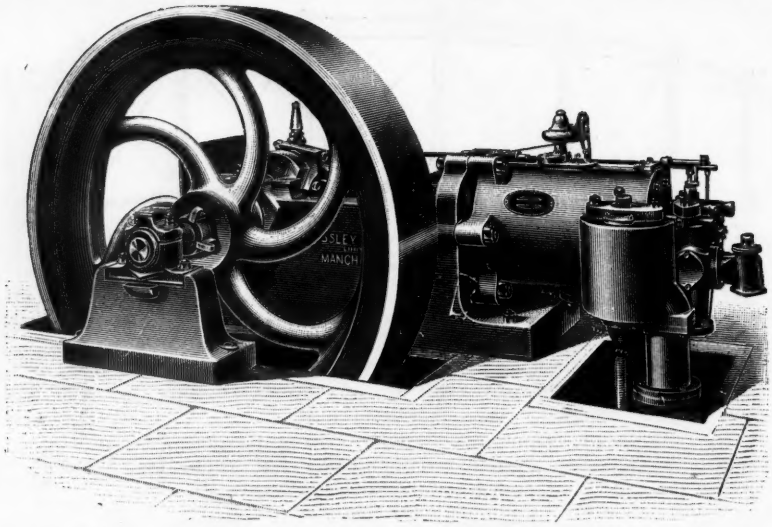

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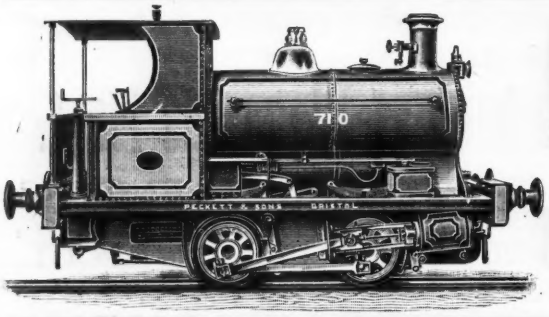

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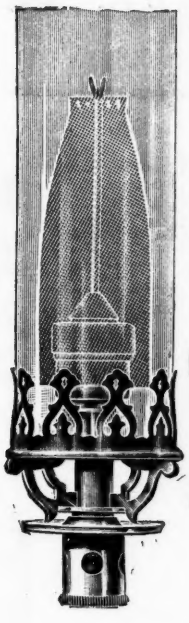

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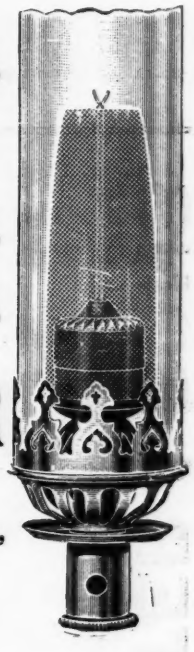

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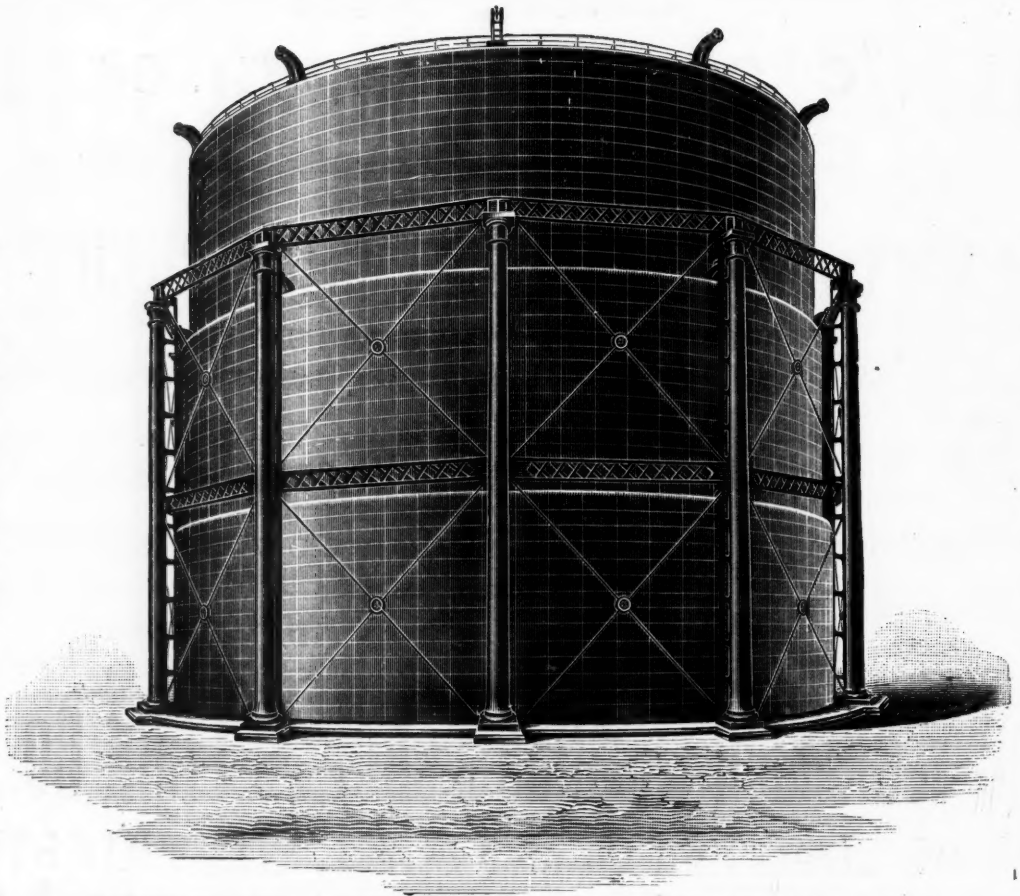

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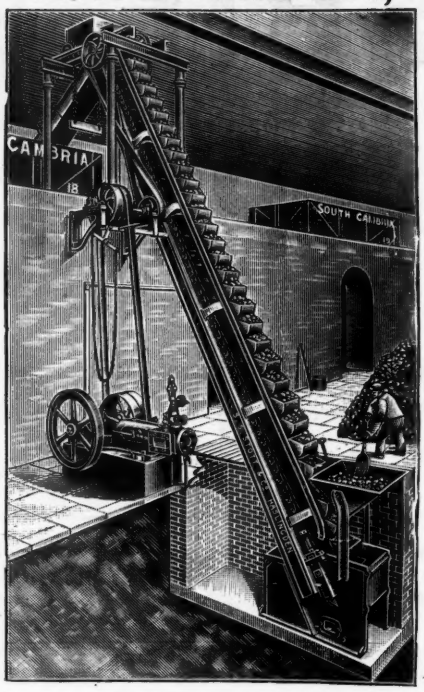

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ADOPTED AT

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GASHOLDERS

OF EVERY SIZE AND DESCRIPTION.

CUTLER'S PATENT GUIDE-FRAMING FOR GASHOLDERS

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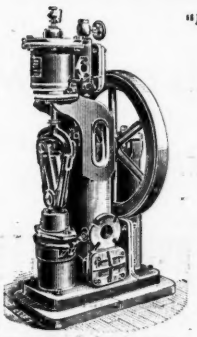

Fig. 703. "SINGLE RAM" STEAM-PUMP.

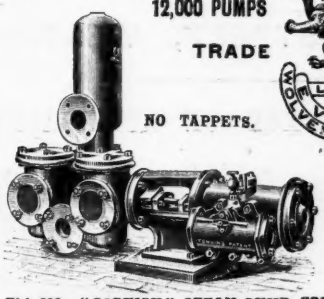

Fig. 598. "CORNISH" STEAM-PUMP FOR BOILER FEEDING, &c.

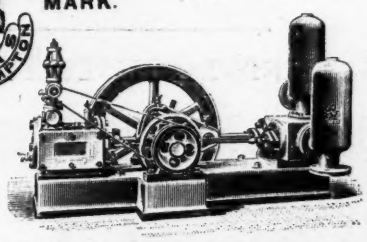

Fig. 655. "RELIABLE" STEAM-PUMP FOR TAR AND THICK FLUIDS.

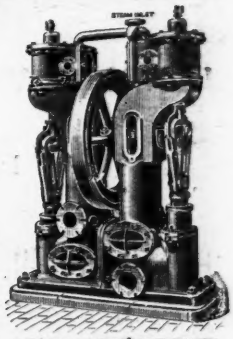

Fig. 712 "DOUBLE-RAM" STEAM-PUMP.

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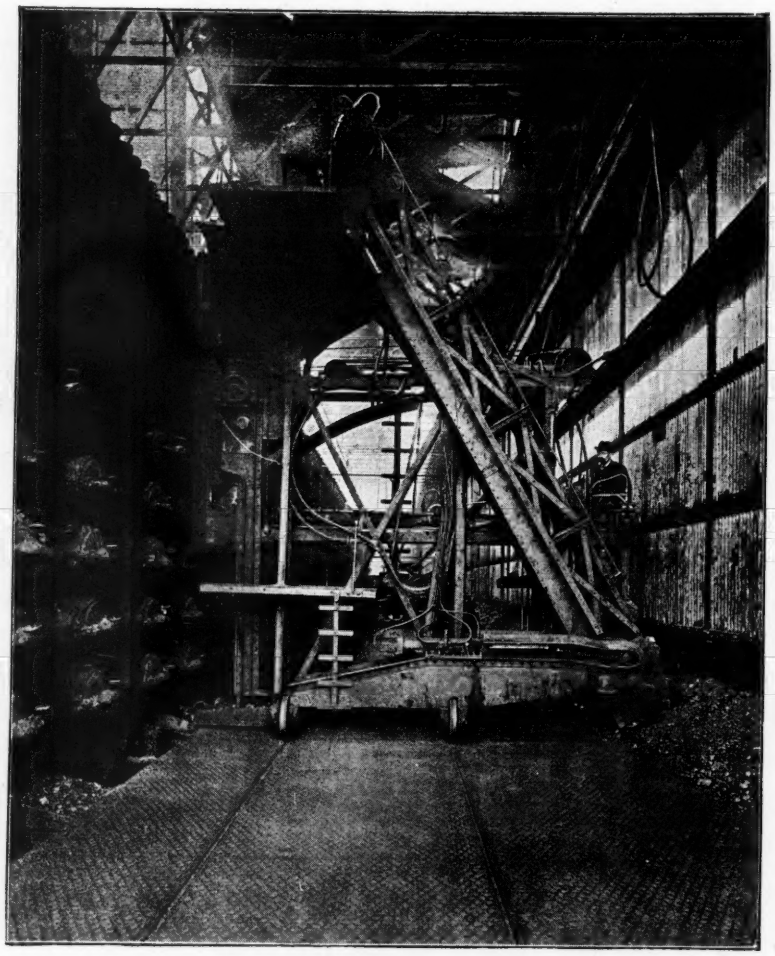

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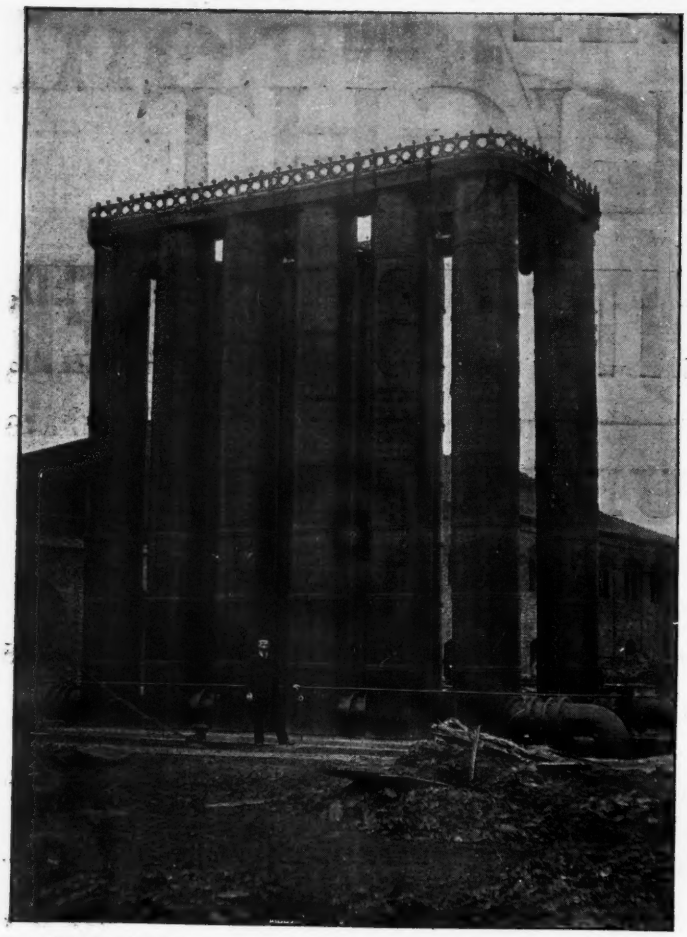

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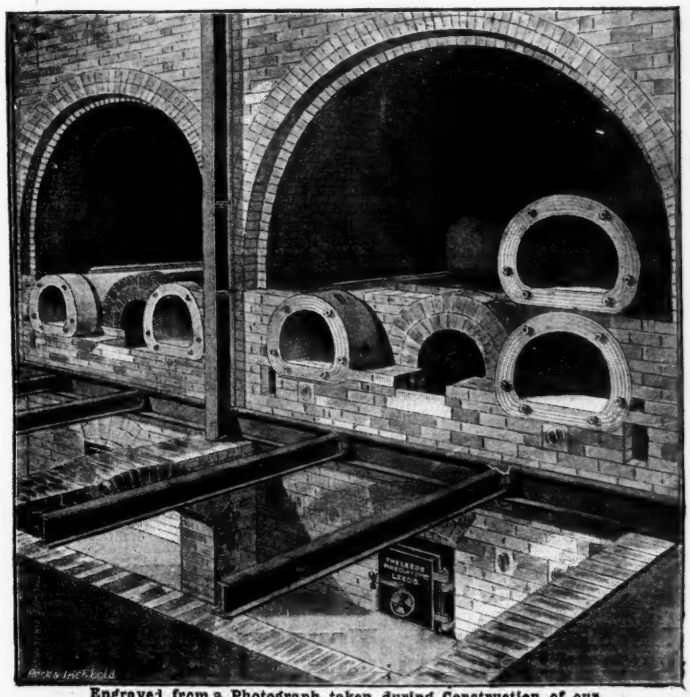

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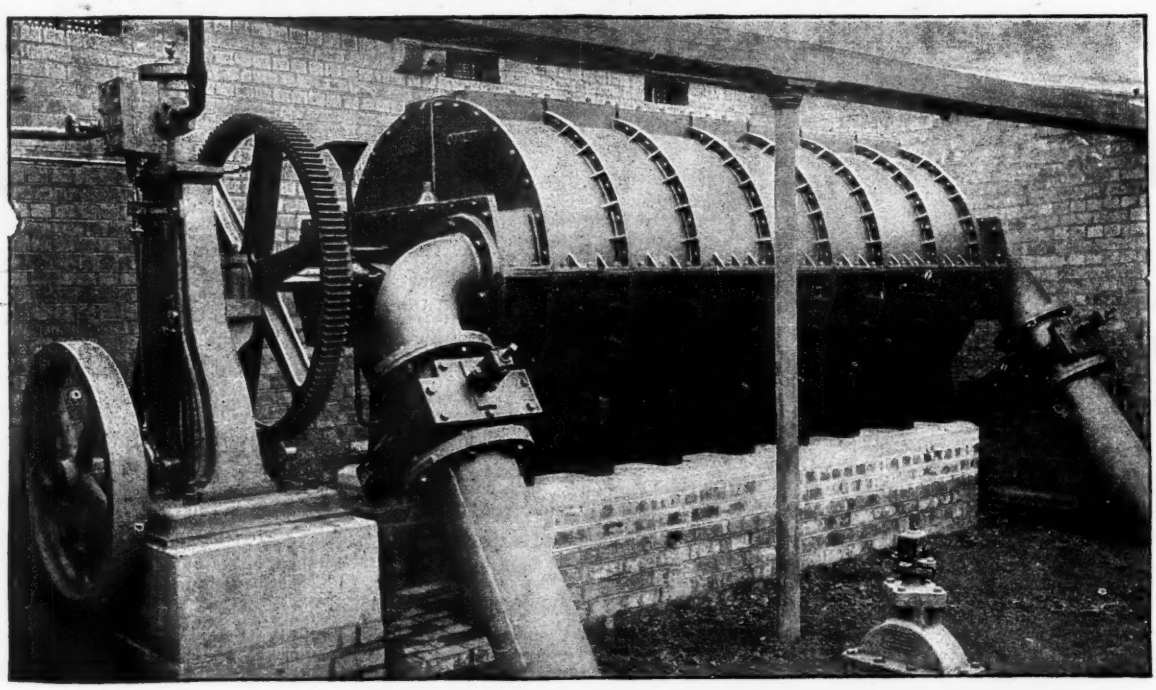

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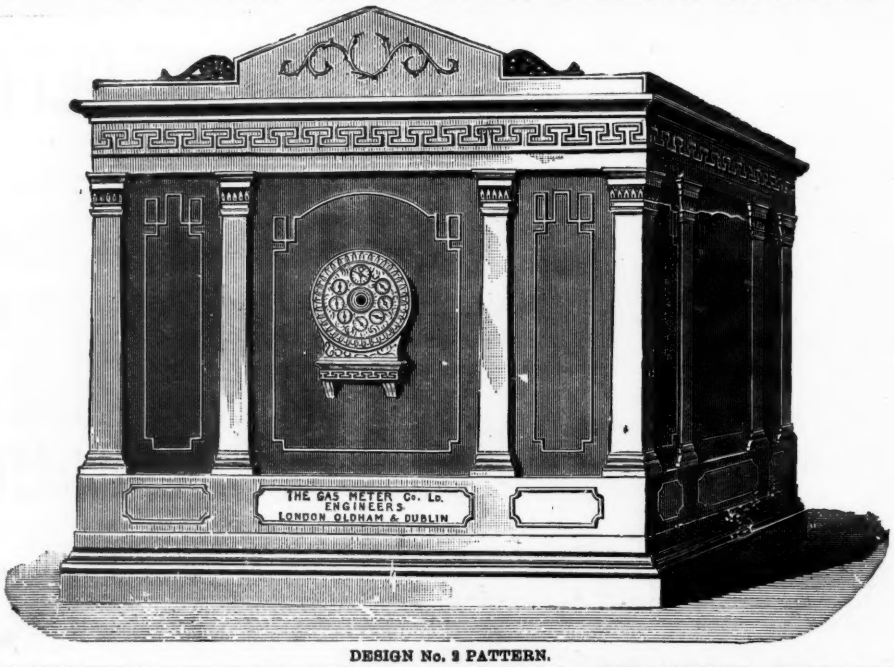

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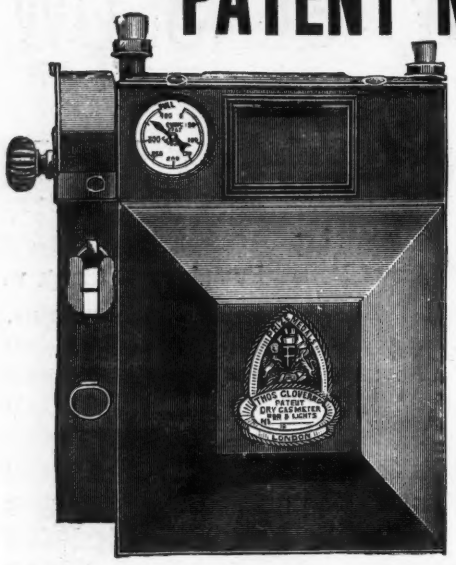

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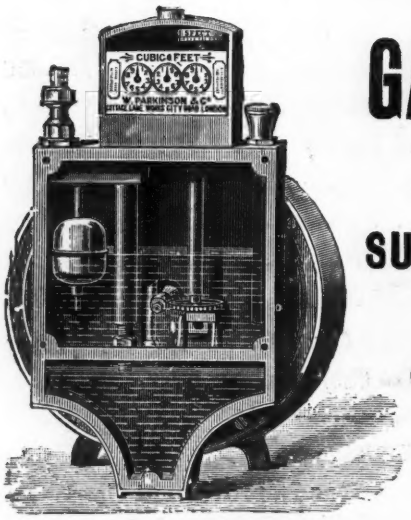

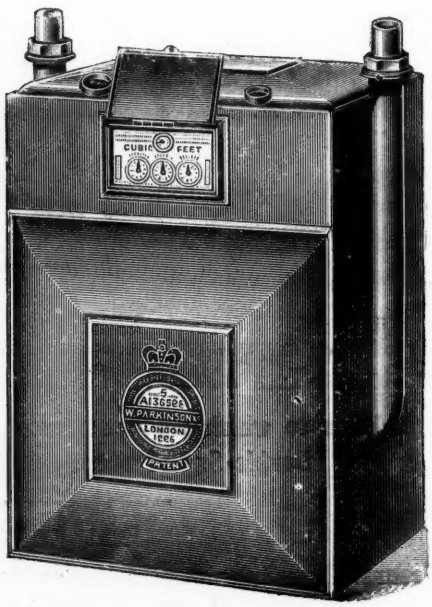

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EDITORIAL NOTES.

The London Government Bill.

THE London Government Bill, as printed, well bears out the promise of Mr. Balfour's speech. It is an eminently simple and lucid measure, under which the coming century will usher in a cluster of important Metropolitan Municipalities. With the text of the Bill in hand, it is not necessary to say much more about the general scheme and its scope by way of supplementing the information we published last week. The most important parts of the subject left in uncertainty by Mr. Balfour's speech were the financial proposals, and the extent to which the re-settlement of Metropolitan self-government would affect the existing powers of the London County Council. It must be said that the more precise information on these and some other debateable heads supplied by the print of the Bill confirms the suspicion that it is over these matters that conflict, in and out of Parliament, will chiefly rage. Since the publication of the Bill, a storm of Progressive opposition has been blowing up, which may give the Government some trouble. It is proposed that when the powers of the existing Metropolitan Local Authorities are transferred to the new councils, in the case of borrowing powers the sanction of the Local Government Board shall be substituted for that of the London County Council. The County Council will not like this. Certain minor powers and duties are to be transferred from the County Council to the borough councils; and some other powers are to be exerciseable by either authority. There need be no serious disagreement over most of these proposed alterations of administration; but some of them will give rise to much bickering. They are not matters with which we are particularly concerned, with few exceptions. The most serious of this order of questions arises over the proposal to give to the borough councils the same powers of promoting and opposing Bills in Parliament and going to law as are now enjoyed by borough councils outside London under the Borough Funds Act. There is much to be said for the opinion that the London County Council should be the financial authority and the parliamentary factotum for all the Metropolitan Borough Councils. Take the case of a Gas Bill affecting, as any London Gas Company's Bill would affect, several of the boroughs. It would amount to a positive nuisance to have separate and independent bargaining over the proposals of such a measure between the promoters and all the councils. One recalcitrant authority might get different terms from the rest, and for this the Company would make reprisals in some form; so that the outcome would be utter confusion. We agree with the judgment expressed upon this proposal of the new Bill by Mr. Howes, the Chairman of the Vestry of St. Luke's, who says it is "much too wide." He would restrict the parliamentary powers of the councils to matters specially affecting their own district, and that alone. For instance, a plan for making new gas-works in a certain district would give the District Council a legitimate claim to be heard by Parliament on the merits, but not on the general financial proposals of the promoters.

A great deal of the Progressive wrath in regard to the Government Bill is merely perfunctory. Of course, this particular Government can do nothing good, in the eyes of some of its opponents. All that kind of opposition is to be expected; and it will not affect the issue in the smallest degree. There is another order of opponents who will take no more by their rancour, which is sure to run high. These are the supernumerary vestrymen who will not be required in the limited borough councils; and the representatives of those smaller parish and district authorities whose present constituencies will be merged into more important areas. Mr. Pickersgill, M.P., is a type of the stern and unbending political opponents of the Government who "cannot away "with" the Bill, at any price. His chief point of attack is the omission of the City of London from the measure. As to this, what we remarked last week holds good; and, for the rest, it is the cheapest of all criticism of a scheme of legislation to blame its limitations, the importance of which is usually strategic. The thick-and-thin partisans of the London County Council do not like the Bill because they believe the new Municipalities will approximate too closely to the importance of this body—which is precisely what the critics of the County Council would desire. At present, the County Council is too far above the various district authorities to pay much heed to their representations—say,

in such a matter as street improvements. The County Council would have to reckon with the Corporation of Westminster differently from the Strand District Board of Works. The only worthy question is whether this would not be to the public advantage. Curiously enough, this view of the subject is not the one which is taken by most Progressives. They think about the probable effect of the Bill upon the London County Council, and on the individual Vestries; they even ask the Vestry Chairmen how they will like to be called Mayors and wear golden chains. But how London itself is likely to fare by the proposed change is not a subject of Progressive solicitude.

Oddly enough, when his great record is remembered, Sir Walter Besant, who has done perhaps more than any other living man to bring Londoners to a sense of their privilege as "citizens of no mean city," condemns the Bill as "the most useless and mischievous measure that "could have been framed." It is to be feared that this sweeping denunciation will only be regarded by other people as one more proof of the unfitness of the literary temperament for dealing constructively with the problems of government. Sir Walter's first objection to the Bill is that it will make cities of the poor and cities of the rich. But that is done already. What is West Ham, and what Croydon? Next he complains that the new boroughs will not be real Municipalities, inasmuch as they will have nothing to do with technical education, the police, the fire brigade, the main drainage, "weights and measures," and many other things that fall to the lot of a provincial municipality. But is it not possible that they may be better off for the absence of these cares and responsibilities? Is provincial management of police, hackney carriages, and some other things that might be named, so much better than the existing London method of doing the same business? Sir Walter Besant calls London "one and "indivisible;" but does he or anybody else think it would be a piece of practical politics to create by Act of Parliament, at this time of day, a London Municipality, and pile upon the new creation all the tremendous duties he catalogues as properly belonging to a Municipal Corporation? He observes truly enough that, if the City had been wise in time, it would have grown with London. We may humbly claim to have offered the very same remark in these columns more than once. That would undoubtedly have been the preferable way of it; but it was not taken. Now we have long passed that turning, and cannot go back to it. Doubtless, the Government of London, howsoever organized, now or at a future time, will be peculiar to itself. But the same remark applies to the local governing arrangements of all other really large and important capitals. Look at Paris, Berlin, Vienna, Rome, New York—everywhere special ways have been devised for solving the problem of good government. We venture to think that the example of London in the same kind during the coming century will not be such as Englishmen will be ashamed of. We are a self-depreciating people; and Londoners especially are not given to overpraise of the administrative system under which they live, or to value its results at their due worth—until they go to live elsewhere. After all is said and done, when Sir Walter Besant or anybody else can point to a large city—an enormously large city—*very* much better looked after than London is at this present, we will join in asking for a Royal Commission to go and see how it is done, with a view to getting a better Bill drafted thereafter.

The Clacton Arbitration.

THE Clacton-on-Sea arbitration was commenced last week; and elsewhere is an abstract report of the proceedings, which possess several points of special interest. The Company have a gas and water undertaking, supplying a district which was artificially created for a seaside resort, mainly for Londoners. The speculation proved successful, so that a locality which originally consisted of a pier and a row of lodging-houses has long been a flourishing town, with an Urban District Council all to itself. It is not necessary to go so far afield as Oklahoma, Klondike, or Rhodesia to find districts once in a desert but now settled habitations of a busy and increasing population. In the case of Clacton, the expansion of the gas undertaking has been a faithful index of the extent and nature of the development of the district; and when the Local Authority thought of taking over the business, that they found they would have to pay for it as a growing, as well as a going, concern. Mr. W. A. Valon, who advised the Company in the matter, asked for thirty years' purchase of the maximum dividends and interest, as ascertained by Messrs. Alfred Lass, Wood, and Co., with the usual 10 per cent. addition for compulsory sale. There was the customary haggling over the number of years to be taken as the multiplier; and once more the case for the District Council, in the hands of Mr. E. H. Stevenson, was made to include an offer of 5 per cent. for compulsory sale. One would think the time had come for the cessation of squabbling over these customary allowances. In the present case, the difference between the parties was not serious, so that the gas portion of the arbitration went off in a very short and easy fashion. With all due respect for the Court of Arbitration, it may be submitted that instances of such successful speculation in gas as that of Clacton are rare; and the proprietors deserve the amplest recoupment for their venture, inasmuch as it would have been sure to increase in value, and they will have some difficulty in finding another investment for their money.

Exit Electricity Generation in Bulk.

LAST week was a fatal season for the new electricity generation "in bulk" schemes, of which so much has been heard of late. They are all gone—three of them for non-compliance with Standing Orders; the last by a hostile vote of the House of Commons on the order for second reading. The Standing Orders are a terrible hindrance to every kind of magnificent project involving a wholesale interference with the rights of Her Majesty's lieges in their own property. Parliament has an old rule, to which it pays the greatest respect, to the effect that no man shall be interfered with in the possession of his land without receiving proper notification of what is intended. Everybody who has at any time had experience of railway work, entertains the most profound respect for—or horror of, according to circumstances—the work of "referencing." The London County Council have learnt something about this business, in connection with their Welsh water scheme. The pithead electrical power schemers have had the same lesson. The most interesting experience, however, is that of the General Power Distributing Company, whose suspended Bill came from the House of Lords and challenged the Fates on Friday last. Mr. Stuart-Wortley—constitutionally the member for the Hallamshire Division of Sheffield, but on this occasion representing the Association of Municipal Corporations—opposed the second reading, on the ground that the Bill was against all precedents governing matters of the kind, and "because it was not necessary or in the "interest of consumers and manufacturers." Mr. Pickersgill, in seconding, revealed the motive of Municipalism more plainly; declaring that the measure "would prevent "the initiation of new schemes by Local Authorities, and "would also effectually check the development of the "schemes which already existed." The Bill was supported in the interest of cheap electricity supply for the public; and a strong appeal was made for getting it before a Select Committee; but in the end the Municipal interest prevailed, and the second reading was negatived by a vote of 164 to 132. This settles the question for the year—perhaps for several years, unless the promoters of similar schemes go to work in a different way, and make their case good upon the merits. This has been the weak point of all these projects. They have been far too vague, too inchoate. The promoters have been willing to take a limitation of their maximum price to 4d. per unit for the first 200 hours in each quarter, and 2d. per unit after; but it has never been proved that these conditions contained the potentiality of good business on both sides. The passing of the now extinct Bills would only have resulted in a new kind of electricity "boom" without justification in fact.

Mr. Reckitt's Petroleum Bill.

MR. RECKITT'S little Bill to make petroleum dearer all rourd by the simple expedient of raising the flash-point of oil from 73° to 100° Fahr., has been printed, and can be had at the cost of a penny postage stamp. Never was so cheap and harmless-looking a Private Member's Bill fraught with greater potentiality for mischief. Small as it is, the Bill is backed by nine members of Parliament, among whom the Scotch party on the late Petroleum Committee are included. It is a very good thing for trade and the public interest that Mr. Jesse Collings, the Chairman of the Committee, is so strongly persuaded of the inadvisability of meddling with the flash-point of oil; but both he and the Government will want all the independent support they can receive, if the

insidious plotting against cheap oil is to be frustrated. If any reader of these lines with influence upon members of what the late Mr. W. Bagehot called the "idle crowd" of parliamentary people is desirous of preventing the threatened restriction of the supply of this necessary of life, he will do his utmost to let his friends see what it is that the House of Commons is asked to vote for. Unfortunately for the credit of those who have made themselves responsible for the Bill, and therefore for the "Memorandum" which purports to explain its object, this information is not supplied by either the clauses of the Bill or the Memorandum. The Bill itself has only two operative clauses—one repealing section 2 of the Petroleum Act, 1879, from "the commencement of the section down to, and including, "the words 'seventy-three degrees of Fahrenheit's thermo-"'meter;'" the other to repeal section 6 and the second schedule of the Petroleum Act, 1879. This is a General Act; and it ought not, in any case, to be tampered with by a handful of private members. In the present instance, the objection to such meddling is strengthened by the circumstance that an ordinary Member of Parliament cannot have adequate knowledge of the probable effect of the passing of the Bill; while the Memorandum, which purports to state its object, is most distinctly misleading. The Memorandum begins by stating that the Bill is to give legislative effect to the intentions of Parliament as expressed in the Petroleum Act, 1871. It seems strange that Parliament should have had to wait 28 years for this fulfilment. We are next informed that this Act placed legislative restrictions on the sale, keeping, and carriage of petroleum with a flash-point under 100° Fahr. This is quite correct; but the statement of fact is followed by a misstatement which one can only hope is not intentional. It is that "the flash-point of "petroleum is the lowest temperature at which it begins "to give off inflammable vapours." If these words were written in ignorance, more's the pity that those who proposed to alter the flash-point of burning oil did not first acquaint themselves with the meaning of the term. Petroleum is volatile at all temperatures, as the human nose is competent to indicate. The flashing-point, as defined by Boverton Redwood, is "the temperature at which a "mineral oil, on being slowly heated, begins to evolve "vapour in such quantity that on the application of "a flame (the 'test flame') a momentary 'flash,' due to "the ignition of the vapour occurs. . . . The flashing-"point is an arbitrary test; the results depending upon the "conditions under which the test is made." The Memorandum proceeds to state that the original open test having proved fallacious, it was replaced by a close test in 1879; the original 100° being corrected to the equivalent 73°. "The purpose of this Bill is to substitute the accurate or "*close test* for the inaccurate or *open test* in the Act of 1871, "and to restore the 100° flash-point prescribed by that "Act." If this is not a *suggestio falsi*, it is a particularly bad example of the fallacy known as the "undistributed "middle." While pretending to "restore" an old test, it makes a new one. If the ordinary Member of Parliament follows this meddling and muddling, he will assuredly burn his fingers. What are Messrs. Reckitt and Co. afraid of, that they do not say at once that their object is to raise the flash-point, as legally established, to 100° Fahr., and make the public take the consequences?

The Trouble of the Building Trade—Suggestion for Conciliation.

As was to have been expected, the ballot of the Plasterers has resulted in a practically unanimous vote for the rejection of the employers' demands; so the lock-out has actually begun. It is to be hoped that the Union Executive are happy in this endorsement of their policy; for the probability is that they and their dupes will be sorry enough later on. Meanwhile, the outbreak is a beautiful test of various hypothetical claims and schemes that have been floating about of late in the nebulous world of "Labour." There is nothing like a bit of fact, such as this, for testing the relative solidity of things. There is the great idea of the federation of Trade Unions, for example. What have the wire-pullers of this proposal to say to the Plasterers? Then there is the philanthropic visionary, like the Bishop of Hereford, who appears to have succeeded to the mantle of the late Cardinal Manning as the self-appointed Prophet of Peace and Goodwill between employers and employed—without knowing anything about the matter. What will he say to the Plasterers? Where are the New Zealand curers of industrial earthquakes by legislative pills? The world appears to consist, from one point of view, of two sorts of people. There are the Visionaries and the Men of Business; and between these orders there is no connecting medium. The former comprise all those whose talk is of Peace Arbitrations, Disarmament of the Nations, the Triumph of Democracy, the Federation of Labour, and all the rest of it. They condemn War in the abstract; and, in brief, pass their time in the state of abstraction. They are the Buddhists of this Western World. In the other camp are the men of affairs, who do not trouble themselves to discuss War in the abstract while there is the Khalifa to be wiped out. They take the job that lies next to hand, and stick to it until it is finished. Such are the men of business, who, in regard to industrial questions, do not trouble themselves about the "isms," but look out for keeping the upper hand in the shop. We should like to lock up together the Bishop of Hereford, Mr. W. Pember Reeves, of New Zealand, Mr. T. Costigan, of the Association of Master Builders, and Mr. M. Deller, the Secretary of the Plasterers' Union, until they arrived at a unanimous verdict upon the trouble of the building trade, and how to deal with it. This would be Conciliation indeed!

WATER AND SANITARY AFFAIRS.

THERE is a clause in the London Government Bill to which exception has already been taken, and that with sufficient reason. It provides that a borough council shall have certain powers of promoting and opposing Bills in Parliament, and of prosecuting or defending any legal proceedings "necessary for the promotion or protection of the interests "of the inhabitants of their borough." To the Water Companies this is practically multiplying some twenty or thirty times (according to the number of borough councils) all the vexations they have endured at the hands of the County Council. Any Bill they may introduce into Parliament would be liable to opposition from all the councils; and, on the other hand, they would all be at liberty to introduce Bills affecting the rights and revenues of the Companies. If the County Council and the Corporation of the City were heavy guns for the Companies to encounter, it is now proposed to bring in an array of mitrailleuses. But perhaps the borough councils would not all agree as to what was desirable in the interests of their respective communities. This raises the question whether it would be permissible for one borough to oppose a Bill introduced by another borough. Are all these Metropolitan boroughs to have jurisdictions as independent as those of boroughs in the Provinces—say Dover and Maidstone? According to the framing of the Bill, one thing is quite evident—that the expenses of the Metropolitan Water Companies in defending their interests in Parliament will be enormously increased. The plea that each borough can only fight for its own area will scarcely avail when an intercommunication scheme is at work. Besides, there are questions which affect the whole of the water supply, and on which every borough may therefore claim a right to speak. Considerations such as these lead us to apprehend that one effect of the Bill, if passed in its present form, would be greatly to multiply Counsel's fees.

The Water Committee of the London County Council have prepared a long report to be presented at the Council meeting to-day, in which they try very hard to find fault with the Royal Commission in presenting an interim report, and with the Government for introducing a Bill to effect a scheme of intercommunication. The Committee express an opinion that the terms of reference to the Commission were originally intended to be dealt with as a whole; but, owing to the water famine in East London last year, the President of the Local Government Board "interrupted "the investigations of the Royal Commission" in order to invite from them a preliminary report upon the last item in their reference. The Committee suggest that if the Commission had dealt with the main question first, the second might never have come before them. The main question is understood to be that of purchase, and the subsidiary one that of control and intercommunication. The Council can only look upon the water supply as something over which they ought to have control; and everything which fails to agree with this view is at once condemned. The proposal to connect the mains is described as one for expending capital on "inter-insurance." There is a marvellous elaboration of argument, so as to show that

intercommunication is for the benefit of the Companies and not of the public, and that the sinking fund to which the Companies object is of so sacred a character that nothing ought to be allowed to weaken its operation. Finally, the Committee recommend that the Council shall oppose Mr. Chaplin's Bill, "so as to obtain such amendments as will "safeguard the interests of the public." We can only conclude that the amendment which the Committee have most at heart is that the Bill, when it comes on for its second reading, be read a second time that day six months. The scheme for which the Bill prepares the way is designed to secure an efficient supply of water to all parts of London. But the Water Committee of the County Council abhor the measure as calculated to confer what they call "permanent "privileges" upon the Companies. Of the consumer very little is said.

Viscount Llandaff, in common with other people of less distinction, is learning something in the course of the inquiry by the Royal Commission on the London Water Supply. His Lordship was startled last week when told by Mr. Clayton, the Chairman of the Chelsea Company, that as late as 1856 the Company had reservoirs in Hyde Park and St. James's Park. Lord Llandaff declared this to be "most extraordinary," though there was no doubt about the fact; Mr. Clayton being in perfect recollection of having seen the reservoirs. Times are altered now. The First Commissioner of Works has just refused permission to a London Water Company to lay a main across a corner of Hyde Park, and the Parks and Open Spaces Committee of the County Council would exclude the Lambeth Company from Tooting Common. Another consideration is that these reservoirs, sanctioned by Royal warrant in the days when George the First was king, and done away with in the reign of Victoria, were created by capital which the London County Council will be quite prepared to treat as "obsolete." Yet the reservoirs served the public for considerably more than a hundred years; furnishing a supply to some 10,000 houses. The removal of the old reservoirs was doubtless due to the growth of London, and the consequent shifting of the intakes. Their history carries us back to the time when the Chelsea Company had an intake in Ranelagh Creek; and then it was that filter-beds were first established. The so-called "obsolete "capital" was not wasted or misapplied; and we question whether the reservoirs in the Parks cost more money than the County Council have thrown away in their ceaseless warfare against the Companies, together with the expense already incurred for the Welsh scheme—a project which may not yield a penny of benefit to the ratepayers or the consumers. The fallacious talk as to the Water Companies having "no monopoly" is out of harmony with the fact, illustrated by the case of the Chelsea Company, that in recent years Parliament has imposed an obligation to supply water where it is demanded, and has restricted the charge to be made for the supply. In regard to the Chelsea Company, there was perfect freedom in both respects down to 1852; and the instance is not exceptional. Prior to this new order of things, the way may have been open for any rival to interfere. But when the Legislature placed the Companies under an obligation to furnish a supply, and fixed the price to be charged, the door was clearly closed against competition so long as the Companies fulfilled all the conditions under which they were placed. Parliament must keep faith with capital, or else capital will not be readily forthcoming for those works which serve the public.

The evidence given before the Royal Commissioners by witnesses representing the Chelsea and Kent Companies shows in a striking manner the absence of any just or reasonable cause for the change which the County Council are seeking to effect in the conditions of the water supply. In these Companies' districts there are no complaints from the consumers; and there is no possible risk of the water famine or deficiency of supply on which so many Progressive arguments are based. One of these two Companies takes a supply from the Thames, and the other depends on the underground waters. But both are alike in this respect—that the supply will be adequate for a long time to come. There is an obvious limit to the demand to be made in future years on the Chelsea Company, owing to the comparative smallness of the area available for further building operations. The Kent Company have an inexhaustible store of subterranean water, not merely locked up in caverns, but ever flowing on towards the sea. It may be said that all the London Companies are not so happily situated. There is, however, a reply to the objection in the approaching completion of the intercommunication scheme, by which all will practically be placed on the same level. The Chelsea Company had to offer to the Commission some kind of explanation as to why they should join in the plan of intercommunication, seeing that they would never receive a supply from the combined mains, but would simply have to render help. Of course, their help will be paid for, on the principle of intersale. But they will have to contribute to the cost of establishing the united system. Undoubtedly there is value in the "united front," and the Companies had never greater need to federate than now, when, as Lord Llandaff remarked to Mr. Clayton, the shareholders have prospered so as to be "worth plucking." In the days of poor dividends, or no dividends at all, the only cry was that the Companies should spend money on new works so as to improve their supply. Having spent money, and getting a reasonable return, they are now to part with their undertakings on such terms as may please the County Council. At least that is the design; but it may fail of accomplishment.

"Specification."—This publication, which is of special value to engineers, architects, surveyors, and others concerned with building operations, when specifying, is now issued in half-yearly volumes, enlarged and illustrated. We noticed some time ago the principal features of the second number; and we have now received a copy of No. 3 (a double number), containing 100 contributions, 628 pages of useful matter, and 100 illustrations. Among the special notes and articles the following may be mentioned: "The Welsbach Incandescent Gas-Light;" "Public Health Notes," by Dr. F. J. Allan; the "Electrician's Glossary," compiled and revised by Mr. E. R. Grote; "Tar Macadam," by Mr. F. Bagshaw; and a "General Glossary," compiled and revised by Mr. J. M'Ewen. The section devoted to the "Gasfitter," as mentioned when noticing the earlier number of the work, has been revised by Mr. Frank Livesey. The book is issued from the offices of the "Builders' Journal" and "Architectural Review," Effingham House, Strand, W.C.

Papyristite Flooring.—Further particulars are to hand respecting the new material "papyristite," mentioned some time ago as an invention of Mr. Gehre, a civil engineer of Zurich, suitable for covering the floors of engine rooms, station meter and governor rooms, and the like. It is now stated that a sample of the material can be seen on application at the Commercial Department of the Board of Trade, Whitehall, any day between the hours of 11 and 5. The substance is partly composed of waste paper, mixed with cementitious ingredients, and is put up as a powder in barrels selling, for trial, at 18 marks per 100 kilos in Zurich. The powder is simply mixed with water and plastered on the floor, roof, or partition to be covered. It sets as hard as stone; yet has a soft, linoleum-like feel to the foot, and is noiseless. It forms a continuous layer, which is absolutely incapable of taking or communicating fire. It is much lighter than ordinary cement; and holes can be easily cut in it, and repaired without showing a trace. A hundred kilos, spread to a thickness of one centimetre, will cover a surface of 91½ square feet. The material can be moulded, or made up into sheets for after use. It takes about 24 hours to set; and can then be polished if desired. It will take a very high gloss, is unaffected by heat, cold, moisture, or acids, and does not stain with nor absorb oil. If all these qualities should prove to be enduring characteristics of papyristite, it should have an extensive use for the purposes already named.

Dr. Oliver Lodge on Smoke Abatement.—In the course of a recent Royal Institution lecture on "Coherers," Dr. Oliver Lodge made an experiment which should interest everybody concerned in the abatement of the smoke nuisance. He filled a bell-jar with magnesium smoke, and then passed a charge of electricity through the jar; whereupon the smoke began instantly to clear—the smoke particles uniting and falling in the form of a white snow of magnesium. Diverging for a moment from his main theme, Dr. Lodge referred to a possible extension on a large scale of this experiment. "Some people," said he, "may imagine that this experiment suggests a means of dispersing London fog. But I do not think electricity could prevent London fog. The only way to prevent it is not to cause it; and the way not to cause it is not to burn coal fires, like savages, in open grates. The day will come when it will be forbidden to import crude coal into London. I confess I should like to see the experiment tried of making gas at the great coalfields, and of conveying it to the towns in huge pipes and conduits. The experiment, of course, could not be made with respect to London—it would have to be conducted on too large a scale; but it might be tried with small towns. It will have to come to that some day. People say that they can't bear gas-stoves. But, as a matter of fact, all fires are gas-stoves. People make the gas themselves, and make it badly. No doubt, however, the gas-stove of the inevitable future will be a very different contrivance from that of to-day."

ESSAYS, COMMENTARIES, AND REVIEWS.

GAS AND WATER COMPANIES IN THE STOCK MARKET.

(For Stock and Share List, see p. 613.)

A COMPLETE change came over the face of things on the Stock Exchange last week. The activity which was in full swing came to an end rather suddenly. In point of fact it had been a little overdone; and the pace was too great to last. Then incidents, such as affairs in China, imposed a feeling of caution, if not of apprehension. So that the record of the week, taken on the whole, is quiet and dull. In one or two departments there was firmness; but in most there has been a decay in prices, extensive but not severe. In the Money Market, there was a good demand; and discount rates ruled steady, though towards the close the tendency became rather in favour of more ease. Business in the Gas Market was, on the whole, no better than moderate. On some days there was considerable animation, but there were more periods of comparative inaction. The tendency, however, was good, and a few moderate advances were effected in quotations; while there were special circumstances to account for the one or two movements which were in the retrograde direction. In Gaslight issues, the ordinary was very fairly active, though not evenly so every day; and after a little hesitation it pushed up another point, marking repeatedly 119, which was the best and the closing figure. There was a very moderate amount of business done in the secured issues at unchanged prices. South Metropolitan was moderately dealt in, mostly at about middle figures. In Commercials there were only one or two bargains. The Suburban and Provincial Companies displayed their usual repose, and there was no change in their quotations. In the Continental group there was continued weakness in Imperial, which fell away materially; and the closing price on Saturday, 224, was the worst of the week. But Union showed a stronger position and advanced; and European was steady. Among the rest, Buenos Ayres and River Plate again advanced; but Hong Kong was depressed by local affairs. Water Companies were in better favour, and Lambeth, New River, and Southwark improved.

The daily operations were: Business in Gas on the opening day was of the quietest description; but prices generally were not at all bad, though Imperial receded 2½. In Water, Lambeth rose 1, Southwark 2, and New River 3. There was quite a revival on Tuesday; business being rather brisk, especially in Gaslight ordinary. Quotations, however, did not move. On Wednesday, there was a pronounced lull, transactions being very light. River Plate debenture rose 1. On Thursday, animation was revived, business being lively and prices good; but Hong Kong fell ½. Friday was a fairly active day; and it was marked by a good buoyant tendency. Gaslight ordinary advanced 1, Continental Union 1½, and Buenos Ayres and San Paulo ¼ each; but Imperial fell 2. In Water, Southwark ordinary advanced 2. Saturday was fairly busy, considering the day; and quotations closed without further variation.

ELECTRIC LIGHTING MEMORANDA.

The Results of the Working of Electric Lighting Companies in 1898—The City of London Company's Capital not "Watered"—Threatened Competition in the City of London—The Triumph of Lord Wantage, V.C.

THE accounts of the principal Electric Lighting Companies for the past year's working have been appearing in the newspapers during the last few weeks; but these statements no longer possess the attraction of novelty, and they have not as a rule contained any matter of special moment for "JOURNAL" readers. The London Companies have been busily working up their various districts, some of which are showing signs of approaching saturation; and several of the undertakings are manifesting a covetous spirit in regard to their neighbours' areas. A particular degree of interest, for several reasons, attaches to the doings of the City of London Electric Lighting Company, whose works are described and illustrated in the current number of the "Electrical Review." They make a fine show, with an engine room 430 feet long, crammed full of machinery. At the meeting of the Company, the Chairman, Sir David L. Salomons, had to explain the policy of the Board in recommending a dividend 4 per cent. less than that paid for the previous year. This reduction was necessitated by an increased capital burden, a reduced price of current, and the charging, for the first time, of all management expenses to revenue. The Company have not quite set their house in order, even now. From supplying an alternating current pure and simple, the system is to be so far modified as to permit of the distribution of the direct current "for motive power or for any other purpose." This does not look encouraging for the prospects of that alternating-current motor which has been promised so long. The Company have also found it desirable to start a wiring scheme, for enabling premises to be supplied on a rental basis for fittings as well as current. The Chairman complained of the difficult character of City lighting, so much of which is required only for a few hours a day during three or four months of the year. Machinery has to be provided for this, which it is almost impossible to make pay for itself.

An interesting part of Sir D. Salomons' address referred to the recent "exposures" of the so-called Mansion House jobbery in connection with the inception of the City of London Company. Our readers will remember how loudly the sniff of Progressive self-righteousness went up over the proceedings of Lord Mayor Savory in this affair; although it was never shown that the City had been wronged thereby. Sir D. Salomons has now shown that the premium paid to the "Pioneer" Company was not so much "water" in the capital of the existing undertaking; and that so far from this capital being "watered" at all, it includes premium payments to the net amount of £175,238, which do not rank for dividend. This statement is conclusive; for if there is any meaning in the slang term, stock cannot be held to be "watered" so long as any proportion of it is premium capital not ranking for dividend. It is very necessary to keep this term of company finance to its proper meaning, because there is a tendency on the part of outsiders to misapply it. They know that "watering" stock is a questionable operation; and they try to make out that this is what is done when, say, the nominal amount of a stock is increased although the dividend is adjusted to a lower rate in consequence. In the case of the City of London Company, the question whether the expenses incidental to the formation of the concern were reasonable or extravagant is a very different one from anything that could be properly stigmatized as a "watering" of capital. The fact of premiums having been paid, is evidence that the public think that the Company's stock represents actual property.

The City of London Company are, naturally, much exercised over the threatened competition of their neighbours. They have sunk some £1,400,000 in their undertaking—of course, under no better guarantee than that given by the ordinary Provisional Order. It is only human nature that, in the circumstances, the Directors of the Company cannot bring themselves to believe that the Board of Trade will really permit, in the area they had fondly deemed their own, that competition in supply which the Act undeniably provides for. After taking the trouble to mark out the districts of the different Metropolitan Companies, it does seem so unfair that the Department should think of allowing one Company to invade a neighbour's territory! It unfortunately happens that the Department not only will think of doing so, but has actually done it in more than one instance. There are two sides to the question; and at the meeting of the Charing Cross and Strand Electricity Supply Corporation on Monday of last week, the Chairman jubilantly referred to the Company's prospects of getting into the preserve of the City, which, he considered "would be a very good thing for them." The truth of the matter is that the Charing Cross Company are selling the cheapest electricity in London—getting only 4·41d. per unit for their output, as against the City Company's average of 6·2d. for 1898. This is where the shoe pinches. Why should the consumers of electricity in the City of London pay one Company nearly half as much again for their supply as another concern would be willing to charge?

Another interesting undertaking is the celebrated London Electric Supply Corporation, whose history has been so chequered. It is impossible to deny the tribute of admiration to the doggedness of Lord Wantage and his associates in sticking to the concern and pulling it through the worst of its financial troubles. Since last June, when the undertaking passed out of the hands of the receiver, a profit of £10,131 has been made, as compared with £6113 for the corresponding period of 1897. Prior to July, 1894, the concern was being carried on at a loss; and then it went into the state of receivership on account of a debenture debt of £170,795. Some of this has been paid off, and the capital of the Company has been reduced by writing down the ordinary shares from £5 to £3. This stock now stands at a premium. Meanwhile the works and distributing plant have been kept up and extended. The business is steadily growing, although the Directors are not too sanguine about it. We take some credit to ourselves for never having despaired of the Deptford establishment in the darkest hours following the disappointment that so early followed upon the embodiment of Mr. Ferranti's grandiose scheme. Deptford will yet justify Mr. Ferranti, though an unkind fate denied to the daring engineer the gratification of helping to realize his visions.

We have no space left to discuss this week the Electric Lighting (Clauses) Bill—a Government measure to fulfil the same purpose as the Gas-Works Clauses Acts; or the rejection by the Standing Orders Committee of three of the electricity generation in bulk schemes, which have so perturbed municipalities in manufacturing districts.

Acetylene Exhibition at Buda-Pesth.—An exhibition of acetylene gas apparatus is to be held in connection with the second International Acetylene Congress at Buda-Pesth. It will be opened on May 14, and will close a fortnight later. The exhibits will comprise plant for the production of calcium carbide, in addition to apparatus for generating and burning acetylene. Gold and silver medals will be awarded on the recommendations of a Jury who will consist of eighteen members appointed by the Hungarian Ministry of Commerce and by other important public bodies. The subjects to be discussed at the Congress are divided into six groups: (1) The manufacture of carbide of calcium; (2) the qualities of carbide and acetylene; (3) the purification of acetylene; (4) generators; (5) burners; (6) miscellaneous matters. Particulars may be obtained of the Secretaries of the Acetylene Gas Exhibition, Buda-Pesth.

MUNICIPAL TRADING.

SECOND ARTICLE.

OUR last week's article on this subject brought the discussion to the point where the proof from experience of the success of Municipal trading, so far as it has gone, was required to constitute the basis of further extension of the practice. As we have often observed in this regard, Progressivism in Municipal politics takes for granted the expediency of the municipalization of every kind of public service; and the public are being insensibly led to believe what is so incessantly dinned into their ears from Progressive platforms and Press. It is necessary, therefore, to insist upon the importance in this connection of the "previous question," as stated by Sir H. H. Fowler at Wolverhampton last autumn (see the "JOURNAL" for Nov. 8, p. 1023). The original duty of local governments did not, as we all know, include the carrying on of any branch of trade. These authorities were established in order "that the cities, towns, and boroughs might for ever be well and quietly governed." No extension of, or departure from this rule is permissible, without its expediency being first proved to the satisfaction of Parliament. Sir H. H. Fowler has clearly expressed the grounds upon which the proof of expediency in cases of this kind must rest. The municipalization of an undertaking or service originated in the locality or elsewhere by private enterprise has to be commended to Parliament, not merely on the score of greater efficiency, but also for reasons of economy. Municipalities, said Sir H. H. Fowler, "have no right to any control, and Parliament has no right to grant any power which would deprive the ordinary citizen of his undoubted right to buy in the cheapest market."

"But," says the Progressive Municipalist, "this is precisely the ground upon which I support my policy. Municipalization is justified by almost universal experience as regards water supply; very largely as regards gas supply; and it will approve itself whenever it gets the opportunity of supplying electricity, of working tramways, and providing other needs of modern communities." To this claim, one can only reply by putting the query, "Is it?" To which the confident rejoinder would be, "Why, of course it is. Look at Glasgow, Manchester, Birmingham, and half a hundred other British cities and towns where advanced Municipalism is found to encourage the brightest and purest local patriotism, and none of the dreadful abuses alleged to be inseparable from trading and the large employment of labour by public bodies have appeared." Far be it from us to asperse the reputation of the many good men who in these great centres of our population serve their generation honestly and well in the thankless and unremunerative field of Municipal government. We hope and believe it will be a very long day before the reproach of American politics will rest upon British Local Authorities. But it is still the fact that our trading municipalism, even so far as it has gone already, is not always and everywhere all that Progressive fancy paints it.

Take the case of water supply undertakings—the first enterprises of a commercial kind to be municipalized. An assured, abundant, and unexceptionable water supply is one of the first necessaries of town life. In his paper on the "Cost of Municipal Enterprise," read at the Society of Arts, Mr. Dixon H. Davies admitted the existence of some reason for vesting the monopoly of water supply in Local Authority, inasmuch as this service is closely bound up with vital questions of public health, does not involve any manufacturing risks, and cannot possibly be replaced by another article. On the face of it, there is almost as much justification for a Local Authority pledging the rates on account of the water supply of the district as for its drainage, roads, or cleansing. Yet, as the Attorney General said in the discussion on the paper, water is "very near the line" separating such obligatory public works as sewerage from trading enterprises. If the matter were looked into, it would probably be found that in the generality of cases the inducement to Local Authorities to acquire the water-works undertakings of their districts was the property value. The "expediency" of taking over the water supply in the public interest was greatly accentuated by the consideration that it was a paying business. We do not overlook the influence that so largely conduced to the expropriation of the Water Companies of the great towns—the necessity of going ever farther afield for the supply, which involved an extension of statutory powers only to be warranted by regard for the single interest of the supplied. A Municipal Water Department could ask Parliament for privileges which a Company of traders would hardly dare to demand. Still, the profit-making side, even of a town's water supply, has rarely disappeared in the process of municipalization; and now, as regards one another, the tactics of Municipalities respecting a coveted source of supply are not distinguishable from those rival private adventurers would adopt. Apart from the question, which only affects some Corporations, of whether Parliament has not granted them better gathering facilities than might have been accorded to Companies, is it so certain that the local government districts of this country where the water supply is municipalized are better off for it? To bring the matter to a point: How would London benefit if the Metropolitan Water Supply were municipalized from to-morrow?

With their entering upon the possession of water-works, the appetite of Local Authorities for trading enterprises and trading profits grew; and the next business which they took in hand was that of gas supply. This advance settled the principle of municipal trading in a manufactured article which is a recognized subject of a statutory monopoly. The process of municipalizing gas-works has gone far, and is still progressing year by year. We are not concerned to argue that it ought to be arrested. It would be waste of time and pains to do so. Only, let it be clearly understood what the process has actually effected, as regards the Local Authorities concerned in, and the populations served by, it. The municipalization of gas supply, as is well known, is differently motived in Scotland and England. In the former country, Municipal gas is sold as nearly as possible at cost price. In England, most Corporation Gas Departments are permitted to make a profit, which goes to the relief of the rates. This is the great attraction of Municipal trading for the Progressive mind. As an advocate of the system frankly told the British Association at Bristol last year, he should see no inducement for Municipalities to undertake any responsibilities of the kind if they were forbidden to make profits. There could not be a wider divergence of views between any two political parties than we have here dividing Progressive desires from Scotch practice. Yet when the more artful Progressive politician in our midst wants to recommend Municipalization, it is in Scotland rather than in England that he seeks his examples. Rarely is he candid enough to proclaim that it is the profits of the business that he wants for Municipal purposes.

A remark dropped at the Society of Arts almost casually by the Attorney-General, contains the germ of the reason for this Progressive reserve. Sir R. Webster observed: "Whatever might be said as to the profit made out of undertakings such as gas or tramways, worked by Corporations, his belief was that if the matter were threshed out, it would be found that the burden on the ordinary ratepayer was less when no such risks were undertaken." This deliberate statement goes to the root of the matter. Usually when Progressives talk about the "success" of the municipalization of gas supply, they cite the totals of capital indebtedness of Local Authorities on this account, and other big figures furnished by the Board of Trade returns. Rarely do they say anything about the price of gas so supplied—still more rarely do they tell what becomes of the money taken from the gas consumers, and show how the ratepayers have profited thereby. The Attorney-General's remark is calculated to send inquirers to the available sources of information respecting Municipal finance. The effect of a first glance over such tables as those compiled by the industry of Mr. James Carter, the Treasurer of the borough of Preston, is startling. There is so wide a margin in the matter of local rating, and local expenses, that it is difficult to make sure of one's ground in comparing one town with another; but it may at least be said that nobody could tell from Mr. Carter's figures which communities are most highly "Municipalized." The city of Bath stands first in a list of county boroughs prepared by Mr. George Swainson, of Bolton; and the Corporation of this exceptionally-favoured community manage to run their "Earthly Paradise" on rates amounting to only 4s. 2d. in the pound. Making allowance for the difference in the School Board rate, this is practically the same charge as the Birmingham ratepayer pays. Leicester, for all its magnificent gas property, pays a little heavier rate. No Corporation have bled their gas undertaking more severely than Huddersfield; yet the total rates are 6s. 1d. in the pound. Among Mr. Carter's statistics there is a summary of gas and water charges; and in this table, of the few places where gas is sold at less than 2s. per 1000 cubic feet, not one has a Municipalized supply. (Widnes is not included in the list.) It would therefore appear that, in the available Municipal finance statistics, the case for the general advantage of a municipalized gas supply has still to be proved.

With regard to the political aspect of the administration of such undertakings as that of gas supply by Municipal Corporations, it is often asserted that no abuses of the kind have yet arisen in connection with the working of Corporation Gas Departments. While this contention is justified in the main, it is not absolutely or universally true. The system is not of long standing; and many trading Municipalities are still largely composed of worthies of the older rule, whose electioneering experiences were free from the complications forced upon the candidature of their younger colleagues. Towns could even now be named where the consideration of the fact that the men employed in the Municipal gas-works have votes, is by no means ignored in the counsels of the Gas Committee. In other places, the depreciation of the standard of management has already gone far. Elsewhere, again, no improvement of the works plant is to be hoped for. It is too soon to "halloa" for the success of the system in general, seeing that we are not yet "out of the wood." This is as far as we can bring our discussion of the subject on the present occasion. Next we hope to deal with certain specific points of the prospective development of Municipalism sketched out by Mr. Davies, and illuminated by the comments of his critics, including Mr. John Burns.

British Association of Water-Works Engineers.—We have received the "Transactions" of this Association for the past year. It consists of the constitution and rules, and the papers and discussions at the annual meeting held at Southampton in May last, which were noticed in the "JOURNAL" at the time. The book has been produced under the editorship of the Secretary, Mr. W. H. Brothers.

THE REPORT OF THE DUTCH COMMITTEE ON THE MANURIAL VALUE OF SULPHATE OF AMMONIA.

We have received from the Dutch Association of Gas Engineers the official report of the annual meeting of the Association at Utrecht on June 13 and 14 last year. The meeting was followed, as readers of the "Journal" will remember, by the visit to England at the invitation of the Incorporated Institution of Gas Engineers; and the report contains a highly appreciative account of the trip. We hope to follow the appended abridged translation of the valuable report of a Committee of the Association on the "Use of Sulphate of Ammonia as Manure" with abstracts of other technical communications presented at the meeting at Utrecht.

The questions dealt with were: (1) Why nitrate of soda is preferred in agriculture to sulphate of ammonia; (2) the grounds, if any, for the preference; and (3) the best means of demonstrating to agriculturists the value of sulphate as a manure. The sources of the information collected by the Committee are: (1) A report by Dr. König on the "Production of Manurial Nitrogen from Natural Sources;" (2) experiments by Dr. Kloepfer on the "Action of Sulphate of Ammonia and Nitrate of Soda;" (3) a dissertation by Dr. P. Wagner on the "Increase in the Yield of Soils by Rational Nitrogenous Manuring;" and (4) a report by Mr. W. G. Blagden on a "Visit to Lord Rosebery's Experimental Farm at Dalmeny."

That the use of plant food stuffs increases the yield of land up to a certain limit is admitted by all agriculturists. When the limit of maximum fertility is reached, the use of more food stuffs is not merely purposeless but injurious. But the maximum fertility is as yet not attained; for statistics indicate that the average yield is very low. Better manuring is needed. Nitrogen, a principal constituent of plant foods, is lacking everywhere; and bad crops may unreservedly be ascribed to the deficiency of soils in available nitrogen. Stable manure and the cultivation of plants which collect nitrogen, do not suffice to bring land to its maximum fertility. In order to reach this, it is necessary to provide nitrogen in the form of either nitrate of soda, guano, or sulphate of ammonia. Import statistics show that in Germany at least nitrate of soda is preferred; and it becomes important to ascertain what reason exists for the preference. The advantages of the salt have been well advertised by persons interested in its sale; though recent experiments prove that it is no better than, if so good as, sulphate of ammonia. In favour of nitrate, however, it may be said that it acts well when applied in the spring; whereas sulphate needs time for the conversion of its nitrogen into nitric acid before plants, other than the papilionaceæ, can assimilate it. Against nitrate it may be urged that an incrustation is formed, and the ground becomes clammy and unworkable by repeated applications; that it is dissolved by continuous rains, and lost in the subsoil, and therefore is unsuited for autumn applications; and that strong dressings affect the quality of the crops, and promote diseases in cereals. Sulphate has not these faults; but it is an acid manure, as the sulphuric acid which remains when the ammonia is oxidized unites with the basic components of the soil, such as lime and magnesia. Plants, however, excrete acids from their roots, and therefore on all soils which are poor in bases they prefer basic to acid manures. Favourable results with sulphate depend on there being a sufficiency of bases in the soil; and therefore sandy soils, &c., which are deficient in lime, must be given an application of marl, lime, gas lime, or Thomas meal in order that the sulphate may have an opportunity of acting properly. It is, however, necessary to take care that lime or Thomas meal is not applied at the same time as the sulphate, but for choice is ploughed in previously. Lime, marl, or Thomas meal should be applied in the autumn; and the sulphate a few weeks before the spring sowing. For winter sowing, the sulphate must of necessity be applied at the time of sowing.

Tests show that 90 to 95 parts of the nitrogen in sulphate are equal to 100 parts of the nitrogen in nitrate. Therefore the two forms of nitrogen may be regarded as about equal in value. It is frequently stated that sulphate is dearer than nitrate as a manure; but at current prices the statement is untrue. Nitrate does not contain on an average more than about 15·5 per cent. of nitrogen; while sulphate contains 20 per cent. of nitrogen. It would seem that the preference frequently given to nitrate rests on ignorance and the results of an improper use of sulphate. Until, however, the sources of nitrate and guano are exhausted, the price of sulphate must be largely dependent on the prices of these manures.

The fact that sulphate is equal to nitrate in value as a manure is confirmed by many experiments. Dr. Kloepfer gives the results of many trials, together with photographs of the crops. His testing field was a rich clay soil in the Valley of the Rühr. It was dressed uniformly with about 3500 lbs. of lime, 525 lbs. of Kainite, and 700 lbs. of Thomas meal per acre. No nitrogenous manure was used on one series of plots. The next series was dressed with about 2600 lbs. of stable manure per acre. The third series was manured with nitrate at the rate of 230 lbs. per acre, half being applied in the autumn and half in the spring. The fourth series had sulphate applied, which was ploughed in in the autumn at the rate of 180 lbs. per acre. The yields with grain crops, potatoes, and sugar beet showed sulphate to be slightly superior even to nitrate. The experiments made at Dalmeny led to similar results: By trials such as these, the value of sulphate as a manure has been proved.

The first and second questions have been dealt with, and there is only the third to consider. The best means of bringing home to the farmer the value of sulphate must be by instructing him in the results of trials such as those mentioned. When farmers generally have recognized the value of sulphate, there will be ample demand not only for the gas-works production, but for that of many more coke ovens than now manufacture the salt. But so long as the supply of nitrate lasts, its price must govern that of sulphate. In Holland, instructors are teaching the farmer the value of nitrogenous manures; and there are many trial fields subsidized by Government on which the instructors can demonstrate the truth of their teachings. But it is not their business to favour sulphate more than nitrate. It should, however, be realized by farmers that the alkalinity of the soil should be ascertained by analysis, and manuring carried out accordingly. Pamphlets setting forth the advantages of sulphate should be disseminated; and the Dutch Association of Gas Managers should in this matter work in unison with the German Sulphate Association, and the English Committee of Sulphate Manufacturers. It would also be an advantage if all the sales were conducted by one broker who would study the quality of the samples, and point out defects wherever they existed. The statistics of German agriculture show that the yield of grain and other crops can be more than doubled by judicious manuring. At the present time, for instance, judicious use of sulphate, or similar nitrogenous manures, would enable Germany to grow all the corn she consumes; and render her independent of imports. Thus the proper appreciation of sulphate is quite as important to the farmer as to the sulphate maker.

PERSONAL.

Mr. C. B. Newton has been appointed by the Carlisle Corporation to carry out the Geltsdale water scheme, subject to the submission of all plans, designs, and specifications to the Consulting Engineer for his approval; and Mr. E. M. Eaton is to be offered the latter position.

At the annual meeting of the Londonderry Gas Company, noticed in another column, appreciative references were made to the services rendered to the City by Mr. John Macnie, who has relinquished the position of Manager and Secretary. The Directors have granted him a retiring allowance equal to two-thirds of his salary; and he will continue to render what assistance he can in the secretarial work. Mr. Macnie has been with the Company the long period of 32 years, and is the senior public official in the city.

The Ex-Lord Mayor of Manchester, Mr. Alderman Gibson, who is also Chairman of the Corporation Gas Committee, was last Wednesday presented with a service of plate, subscribed for by members of the Council and their colleagues of the Art Gallery and Technical Instruction Committees, "as a token of their appreciation of his personal character and in recognition of his valuable and efficient services as Lord Mayor of the city of Manchester for the year 1897-8." An illuminated address, recording a resolution passed by the Council on Nov. 9, recognizing the admirable way in which Mr. Alderman Gibson had performed the duties of his office, and the services rendered by Mrs. Gibson, the Lady Mayoress, was also presented.

Mr. Douglas H. Helps, who, as previously mentioned in the "Journal," has been appointed Engineer and Manager of the Redhill Gas Company, was last Thursday the recipient of a handsome testimonial given by the staff and workmen of the Croydon Gas Company. It consisted of a walnut sideboard accompanied by an illuminated address. The presentation, which was made by the chief foreman, Mr. P. Cantwill, was followed by a smoking concert in the Workmen's Club on the works; Mr. Charles Hussey, J.P., the Chairman of the Company, being present. During the evening, Mr. A. Caddick, Mr. Helps's successor, was officially introduced to the men by the Engineer and Manager (Mr. J. W. Helps); and altogether a most enjoyable evening was spent.

As noticed in the "Journal" last week, Mr. T. J. Bush, Engineer of the Australian Gaslight Company has left Sydney for England, at the request of his Directors, to inspect and report upon the many improvements now taking place in the production of gas. Before he started, the officers and staff of the Company embraced the opportunity of showing in a practical form their appreciation of him as a fellow officer by making him a present. It consisted of a dressing-case bound in crocodile skin, with fittings of solid silver, with Mr. Bush's monogram on each; the central bottle containing the following inscription: "Presented to T. J. Bush, Esq., by the officers and staff of the Australian Gaslight Company, Sydney, New South Wales, January, 1899." The presentation was made in the Board-room at the Head Office of the Company, by the Secretary (Mr. R. J. Lukey), who assured Mr. Bush that he was very popular with all the officers and staff, and that they were glad of the opportunity of showing it. They wished him a pleasant journey, an enjoyable time at home, and a safe return to Sydney; and expressed the hope that he might be long spared to continue his connection with the Company. Mr. Bush suitably acknowledged the gift.

OBITUARY.

We regret to announce that Mr. ROBERT MOODIE, Manager of the Redheugh works of the Newcastle and Gateshead Gas Company, died on the 1st inst. Mr. Moodie entered the service of the Company about fifty years ago. He was first engaged in the gas-fitting and meter department; but, later on, owing to his energy and ability, he was appointed Outdoor Superintendent, having charge of the mains and service-pipes. When the new works at Redheugh were started about 25 years ago, the late Mr. V. Wyatt was appointed Architect and Engineer, and Mr. Moodie was transferred there to superintend the construction. Finally, on the first section of the works being ready for the production of gas, Mr. Moodie was appointed Manager, which position he held till his death. During his management, the works grew greatly; and they are now capable of making about 8 million cubic feet of gas daily. Mr. Moodie was held in the highest respect and esteem both by the workmen under his charge and by a large circle of friends. This was testified by the very large attendance at his funeral, which took place on Saturday last.

NOTES.

The Trajectory of Water Jets.

Some curious results come out from a long series of experiments carried out at the Iowa State College, in which photography was enlisted to record the course taken by water when projected in the form of "fire streams" from the various kinds of nozzles in common use in the neighbourhood. The experiments were conducted under the superintendence of Professor Marston, the Director of the Civil Engineering Faculty of the College; and were originally designed to supplement or prove the ordinary tables of discharge of such streams. In this regard the results are inconclusive; but the experiments were interesting in other ways. One of the definite results obtained was the registration of the form of trajectory of the water jets when the nozzle and the pipe were held at different angles. It is a familiar dictum that to command the greatest range, say, of a water jet, it must be discharged at an angle of 45°; and this is confirmed by the majority of the town experiments. Pipes were held at angles with the horizontal of 15°, 30°, 45°, 60°, and 75°, with the general result that those at 45° carried farthest. At low pressures, however, the jets at 60° went almost as far as those at 45°; and at the higher pressures, the jets at 30° pressed the others hard. At the supreme elevation of 75°, the higher the pressure, the loftier the jet; but also the more vertical the drop. Generally, it seemed to follow that when the pressure at the base of the branch pipe attained 50 lbs. per square inch, any angle from 30° to 45° would carry the jet to practically the same range.

The Use of Oxygen for Cases of "Gassing."

The employment of pure oxygen as a means of reviving people who have become "gassed," accidentally or otherwise, is becoming a commonplace of "first-aid" ambulance work as adapted to gas and other chemical factories. It is strongly recommended that a handy cylinder of oxygen, fitted with a suitable attachment for inhalation, should be kept at all establishments of the kind, and that the workmen likely to be concerned in "gassing" cases should be instructed in the use of the method in order to save time that would otherwise be lost in running after the foreman or other superior officer. The simplest kind of apparatus for administering oxygen to the unconscious consists of a rubber pipe connection from the cylinder (or a rubber balloon previously filled from a cylinder) ending in a vulcanite piece for insertion into the patient's nostril. This is preferable to insertion in the mouth, by reason of the sufferer's teeth either being clenched at first or his closing them strongly in the course of recovering consciousness. In some cases, the sufferer has first to be brought bodily out of a suffocating atmosphere before any measures for restoring him can be taken. This involves the entry of the rescuers into the dangerous locality, which is a matter requiring careful previous arrangement by the responsible management, inasmuch as different protective measures are called for, corresponding with the degree and nature of the danger to be met. Rescuers may need to be armed with protective appliances, ranging from a simple sponge dipped in vinegar, to hold before the nose and mouth, to the elaborate Zimmer gear. As to all these systems and devices, it is to be remarked that their efficacy depends as much upon familiarity with their uses by periodical drilling, as upon the nature of the methods themselves.

A Home-Made Spectroscope.

At the present day so much research work upon natural and artificial illuminants is carried on by means of spectrum analysis that some knowledge of the methods, apparatus, and terminology of this department of science is necessary to all who would carry the comparative study of lights farther than mere photometry. There exist numerous treatises on the subject; but "Nature" has deemed it worth while to procure from Professor Sir Norman Lockyer a brief elementary description of a simple spectroscope and its teachings, which was published in the numbers of our contemporary for the 16th and 23rd ult., to which we have pleasure in directing our readers' attention. The object of this instructive article is to explain how the "necessary shorthand" of scientific references to the spectrum is based upon phenomena which everyone can reproduce for himself by taking a little trouble, and going to the expense of a small optical prism. The author explains how the key to the natural hieroglyphics of the story of light is supplied by the rainbow, which we can copy by the aid of a prism or grating. He describes how a sixpenny prism can be made to serve the purposes of a simple spectroscope by sticking it at one end of a lath with a candle or other light source at the other end. The flame of the candle, viewed sideways through the prism, gives a band of colours. This spectrum is impure, because the images overlap. If two pieces of tinfoil with perfectly straight edges are gummed on a piece of glass so that the straight edges are parallel and very close together, and this slit screen is placed before the candle, we remove the difficulty of overlapping. By this simple form of apparatus the nature of different light sources can be explored, and the observer made acquainted with the phenomenon of the continuous spectrum as exhibited by a candle or coal-gas flame, and so on.

Russian Tests for Portland Cement.

According to information supplied by Mr. R. W. Lesley to the Engineers' Club, Philadelphia, and published by "Engineering Record," the Russian Government have two official systems of Portland cement testing—one for use in the laboratory of an expert, and the other for the guidance of clerks of works. Generally, it is prescribed that only slow-setting cement should be supplied. The test for this is a pat of neat cement prepared upon a glass plate. After the lapse of three-quarters of an hour, not before, this cake must have acquired such a degree of hardness that the fingernail will not scratch it, nor the finger cause any water to ooze out by rubbing. Such a cake immersed in water for 28 days must show no cracks or warping on the edge. As regards fineness, not more than 20 per cent. should remain upon a 900 sieve. In the selection of cement for construction purposes, preference is given to the make of cement (everything else being equal) which is strongest after seven days in the pure briquette. In the case of known brands, the process of testing is simplified and reduced to the test for: Time of setting; keeping under water; fineness of grinding; breaking test seven days pure. Uniformity of the weight of barrels is insisted upon, within 2 per cent.; because cement is usually bought by the barrel. Manufacturers are reminded that it rests with them to give their cement the property of not setting too quickly. Cracks and warping of the edges of the pat show that free lime is present, and that all the processes of the formation of silicates did not proceed conjointly. Cement which has been warehoused in the dry for a month or six weeks is preferred to the fresh article. The best test for Portland cement is decided to be the tensile rupture; because although the material in use is subjected only to pressure, compression tests are difficult and expensive to make. In gauging cement for this test, one-third of its weight of water is added. The moulds rest on slightly moistened paper, spread over a gypsum slab, which must be clean and highly hygroscopic. The mould is lightly struck and shaken, and turned upside down before the setting takes place.

Lighting the State, War, and Navy Department, Washington.

Some interesting particulars are published in "Engineering Record" in respect to the lighting of the State, War, and Navy Department, at Washington. The building contains 2½ acres of corridors; and the hot-water heating plant, by Messrs. Bartlett, Hayward, and Co., of Baltimore, is probably one of the largest of its kind in the world. Originally the artificial lighting was effected by 6000 gas-jets, of which on the average 144 were in constant use throughout the 24 hours. Subsequently an electric lighting plant was introduced; the total number of lamps fixed now amounting to 2600, of which 360 are in constant use. It is a significant proof of the inroad of the mechanician upon the domain of the architect and majordomo, that whereas when this great Government building was finished, the only machinery it contained were a jewellers' lathe, and a grindstone actuated by foot power, now it has a machine shop, plumbers' shop, smithy, small brass foundry, and four carpenters' shops. These shops are provided with modern machine tools. There are besides, two printing offices in the building. A great variety of electric lamps are used in the building; none being passed in without test. They must come within 5 per cent. of the specification, which requires at 112 volts 16-candle power, and 3·1 watts per candle efficiency. These lamps are expected to run for 500 hours, when they are renewed. They cost 18 cents each. What with this, and taking the cost of current at 4 cents per unit, these 3·1 watt lamps are esteemed the cheapest available. Particular attention is paid to this point of current consumption, as it is found to be one in regard to which the astute lamp salesman often imposes upon the purchaser. Besides the electrc lamps, about 500 Welsbach gas-burners are used for lighting the desks. Some of the mantles have been in use two years; others are soon destroyed. The destruction of mantles is more from the little explosion that occurs in lighting than from their use. The coal gas supplied to the building tests 21-candle power when burnt from a Beacon Company's lava tip union-jet burner, consuming 5 cubic feet of gas per hour at a pressure of 10-10ths. It is not stated whether the supply is coal gas or carburetted water gas; but it is probably the latter.

TECHNICAL RECORD.

MIDLAND ASSOCIATION OF GAS MANAGERS.

The Annual General Meeting of the Association was held on Thursday, at the Grand Hotel, Birmingham; and there was a fair attendance of members—about fifty out of a total of something under a hundred. The PRESIDENT (Mr. J. S. Reeves, of Bilston) occupied the chair.

The Honorary Secretary (Mr. C. Meiklejohn, of Rugby) was unavoidably absent from the meeting; and Mr. A. Cooke, of Oldbury, kindly undertook the duties of the position—reading the minutes of the last meeting, which were confirmed.

ANNUAL REPORT AND ACCOUNTS.

The twenty-first annual report of the Committee was then presented, detailing the transactions of the Association during last year, and notifying that eight new members joined the Association, while two had resigned and two had ceased membership under Rule 15. The accounts submitted showed a balance in favour of the Association of £93 5s. 6d.

Mr. T. GLOVER (West Bromwich) proposed the adoption of the report and accounts; and his motion was agreed to without discussion.

THE VOLUME OF ASSOCIATION REPORTS.

Mr. J. T. LEWIS (Wellingborough) proposed, and Mr. W. WINSTANLEY (Newcastle-under-Lyme) seconded, that copies of the volume of Association Reports should be presented to the members, as in previous years. This was agreed to.

NEW MEMBER.

On the motion of Mr. W. A. SAPEY (Tamworth), seconded by Mr. R. KING (Wolverton), Mr. George Duncan, the Manager of the Melton Mowbray Gas-Works, was elected a member of the Association.

The PRESIDENT then read the following

INAUGURAL ADDRESS.

Gentlemen,—Before proceeding with my address, permit me to thank you sincerely for the honour you have done me in electing me President of the Association. Though I have considerable distrust in my fitness for the office, yet with the support you will give me I hope I may be able to discharge its duties to your satisfaction.

I feel sure you will agree with me in regarding the preparation of what is usually dignified as the President's Address as a task of increasing difficulty. So much has been said, and well said, about the details of gas-works construction and management, that it is well nigh impossible to find anything new to say about them. There, however, is one safe method of procedure which may be adopted when making the attempt to interest the members of this and kindred Associations, and that is to state one's own experience and practice in the conduct of the undertaking for which one is specially responsible. Generally the principles we follow in our separate undertakings, and our methods of working, reflect pretty accurately the opinions we individually hold on such matters; and it may not be unfair to assume that the particular works of each manager are an expression of what, under the circumstances, he considers best.

Of course, obstacles sometimes prevent a capable man from bringing his works up to the standard of his opinions; but these obstacles must eventually disappear, and his works, though possibly by no means model ones, will have all the essential parts of such, and be well ordered and efficient. In view of these considerations, and in the absence of newer and more attractive matter, I venture to give the methods of working I have found it convenient to adopt in connection with the undertaking of which I have charge. I have no novelties to discourse about, for what I have adopted has generally had its value demonstrated elsewhere.

With respect to retorts, these are set eight in a bed, ⏀ shape, 22 in. by 16 in. by 20 ft. long, stopped off in the middle. They are heated by regenerative furnaces of the kind known as "Klönne's," with some modifications introduced by one of our esteemed Past Presidents—Mr. R. O. Paterson, of Cheltenham. These settings—some of which have been working for six years—continue to give great satisfaction. The normal output of gas per day per mouthpiece is 8000 cubic feet, with an expenditure of fuel of about 13 per cent. There is no need for anyone here to proclaim the superiority of regenerative settings over the old-fashioned direct-fired ones. Their almost exclusive use throughout the country attests their value. The advantages they offer in the economy of fuel, facility of control, and more regular heats, must eventually cause them to be universally adopted.

Along with the adoption of regenerative firing came, in my case, the abolition of hydraulic mains, and the insertion of a separate valve to each ascension-pipe—a system which, as you are aware, has been in operation at the Cheltenham Gas-Works for more than thirty years. Happily with the hydraulic mains has also disappeared much of the trouble and annoyance of pitched-up mains which seemed inseparably associated with that time-honoured and, in some respects, beautiful piece of apparatus. There is a further advantage gained by dispensing with the so-called water-seal—but what in practice often proved a tar-seal—and that is an increased yield of several hundred cubic feet of gas per ton of coal carbonized; a result well worth our notice.

The gas, on entering the foul main, is at once separated from the heavy tar, and traverses a line of 18-inch cast-iron pipe running round three sides of the retort-house, to the condensers proper. The condensers are formed of several tiers of 16-inch cast-iron pipes, set horizontally with a slight inclination from the inlet to the outlet. The pipes are placed in a lean-to house formed of corrugated sheets, and amply protected against undue variations of temperature. I am convinced that the deposition of naphthalene in works, mains, and distributing plant, is frequently and largely due to great variations in the temperature of the gas while undergoing condensation.

Condensers placed so as to receive the sun's rays, and with no protection against frosts at night, must be irregular and sometimes interrupted in their action. With the arrangement I have in use—which also includes provision for the admission of a little steam when necessary—there is no difficulty in maintaining in the coldest weather a normal temperature of about 60° Fahr. at the outlet of the condensers.

From the condensers, the gas passes to the exhauster, and is then sent through a washer giving a seal of from 4 to 6 inches of ammoniacal liquor, which has the effect of pretty thoroughly removing any particles of tar the gas holds in suspension. The gas then passes through two tower scrubbers, one of which is filled with Livesey boards, over which is continuously pumped a stream of ammoniacal liquor. The second scrubber is filled with coke, through which flows a stream of clean water, delivered intermittently through a tumbler and distributing pipes. I do not think any advantage can be claimed for this type of scrubber over the more modern "Standard" washer-scrubber type; but the tower scrubbers have been working satisfactorily a good number of years, and there has been no occasion to discard them for others. We obtain from 30 to 32 gallons of 10-oz. liquor per ton of coal carbonized—a result which, I think, will compare favourably with those obtained elsewhere.

Our purifying plant, which is relatively large, consists of two sets, with four boxes in each set. One set (22 ft. by 16 ft.) is filled with lime, and receives the gas first. The other set (16 ft. by 16 ft.) is charged with oxide. The lime purifiers are worked in the proportion of one of lime to three of oxide; the lime taking up more or less the carbonic acid and sulphur compounds.

As an aid to the revivification of the oxide *in situ*, and as a means of lessening the cost of purification, for the last two years I have adopted the plan of introducing 1½ to 1¾ per cent. of air into the gas. A small Roots blower is fixed in the engine-house, and is worked by a belt running over the shaft of the rotary exhauster. Air is passed from the blower through a meter, and delivered into the foul main over the retort-benches. There being no hydraulic main, the air is introduced to the gas at a point where its temperature is highest, and where presumably the tarry hydrocarbons held in suspension in the gas most abound. It has seemed to me that if carburization of air is at all possible without artificially heating the tar, this is the point where the air should be admitted. In my case, so long as the quantity of air admitted has not exceeded 1¾ per cent., I have not found the illuminating power of the gas was deteriorated in the slightest degree; while the effective duty of the purifying materials has been enormously increased.

On several occasions more than 11 million cubic feet of gas have been purified per box, against less than one-fourth of that quantity purified under ordinary conditions. As may be expected, much more gas is purified per box during the summer than during the winter months. This is no doubt due to the increased energy of chemical action at the higher temperatures, together with the slower movement of the gas through the purifiers. The deleterious effects of air when admitted into coal gas under ordinary conditions has probably prejudiced its use; but if the air is employed in the way, and in the relatively small quantities, I have described, not only need no mischief be apprehended, but a most satisfactory gain may be secured in the reduced cost of purification. The apparatus required is of a simple character, and needs little attention. The important feature of the method is that air is introduced to the gas when it is at its highest temperature, and when it is saturated most fully with tarry hydrocarbons.

Going outside my own personal experience, I think the extension of water-gas plants during the past year has not been quite so marked as in previous years, which is probably due to the better prices obtainable for coke, and the anticipated restrictions which the Government may place upon the use of water gas. There is, however, in my judgment a distinct advantage in having a water-gas plant as an auxiliary to fall back upon in case of a sudden demand for gas, and as a convenient method of enriching poor gas; but the mild weather of the past winter has not favoured the use or need of water gas, particularly in this district, where there is a ready market for coke, and where the transport of oil adds considerably to its cost.

Inclined retorts continue to make their way; and ere long we shall have several additional installations in the Midlands. An invitation to visit one or more of them may be anticipated by our Association. Charging, drawing, and their attendant coal breaking and conveying machinery, are also receiving a good share of attention; and several Midland works—my own being among the number—are being equipped in this way.

The advantages of machinery with horizontal retorts over

inclined ones may be doubtful where entirely new works have to be constructed; but where horizontal settings are already in existence, to discard them in favour of inclined ones would involve expensive structural alterations, and the sacrifice of much costly brickwork. As yet, I have had no personal experience with machine charging; but I quite anticipate important advantages from its adoption—not the least being the simplification of labour, and the relieving of stokers of one of the most trying portions of their work.

With regard to gasholder construction, it does not appear that any new departure has to be chronicled. The enormously large structure erected by Mr. Livesey at the East Greenwich works is a record which, if equalled, is not likely to be exceeded. The tank and gasholder in course of construction at the Saltley Gas-Works (which, through the courtesy of Mr. Hack and his Committee, we were privileged to see something of at our last meeting) will, however, when completed, be the nearest approximation in size to those at East Greenwich, and the holder will be the second largest in the world.

Not the least gratifying feature in connection with the huge holder at Saltley, and the extensions that are being carried out therewith, is the irrefragable testimony borne to the growing character of our industry—and that in the presence of keen competition with its rival the electric light, supplied under municipal management, and probably under conditions most favourable to its extension. What is taking place in Birmingham in regard to gas-works extension, applies in a lesser measure to most of the manufacturing towns in the kingdom.

The chief cause of this growth doubtless is the extended use of prepayment meters. From experience, I can speak most favourably of them. The Company I represent have about 1200 of them in use; and the number is increasing steadily. We commenced by putting in slot-meters in houses where gas-fittings were already fixed; but later a point was reached when it was considered desirable to supply fittings also free. This has been done. The fittings comprise a slide, a bracket, a boiling-burner, and the necessary piping, the rental of which is considered met in the charge of 1d. for each 25 cubic feet of gas supplied. There is, of course, a considerable amount of extra trouble entailed in working these meters; but the trouble is paid for in the increase of revenue from the sales of gas, and undoubtedly the system is appreciated by the industrial portion of the community, on whom it confers a larger measure of safety and comfort.

Perhaps the great novelty of the year in gas lighting was the new burner of the Welsbach Incandescent Gas-Light Company; and though it does not realize all that was promised on its behalf at its inception, it is a distinct improvement on the older form of bunsen burner, which it may eventually supersede. Of the improvement that has taken place in street lighting with incandescent burners, we have some excellent examples in the city in which we are assembled. New Street, and streets in the neighbourhood of the Council House, are most effectively lighted, and are well worth our notice at night time. Other cities and towns furnish similar examples of good street lighting.

The past year was marked by a further advance in the price of coal; but happily it has not adversely affected gas undertakings, as concurrently with the advance came an increase in the value of coke and sulphate of ammonia. How far the selling price of the latter has been influenced by the action of the Sulphate Makers' Association, it is difficult to say; but certainly the efforts made by the Association to bring prominently before the public the valuable properties of sulphate of ammonia are steps in the right direction, and must eventually benefit all gas undertakings. I am not now a maker of sulphate, but sell the ammonia liquor in a concentrated form, which admits of the recovery from it of cyanogen as well as ammonia in the form of sulphate. Whether, however, we work up our liquor or not, the selling price of sulphate is the factor which determines the value of the crude liquor; and the efforts made by the sulphate makers to bring into prominence the value of the article they produce are timely, and deserving of our hearty support.

When perusing the figures given in the analyses of accounts of gas undertakings given in the "Gas World Year Book," two points specially interested me; and to these I wish briefly to call your attention. The first is the amount of capital employed per ton of coal carbonized; and the other, the amount contributed in rates and taxes.

Where the undertakings are owned by municipalities, as might be expected, where not only a low rate of interest is paid, but the loans themselves are being wiped off by annual payments, a great difference is shown in the amount of capital employed. In one case, £1 10s. 11d. per ton is sufficient; while another undertaking employs £13 19s. 2d. It must be obvious that as both of these concerns belong to municipalities, either the selling price of gas or the profits made by the respective owners must be seriously disproportionate. The rate per cent. of interest for loans is probably much the same in both instances.

With respect to the gas companies given in the list, in one case £3 14s. 9d. per ton serves; while in another £12 9s. 9d. is employed. These are extreme instances; and a great difference exists in the magnitude of the works. But even in large concerns, wide variations are shown, amounting to about 100 per cent.

With regard to gas companies, is it not desirable that there should be a closer approximation than is here shown in the relative amounts of capital employed per ton of coal carbonized? The interests both of gas companies and their customers are promoted by low capital charges; and till this consummation is reached, no hard-and-fast lines should be drawn in determining what amount of a company's expenditure should be charged to revenue and capital respectively.

Low capital charges tend to secure the maintenance of good dividends and low-priced gas; but not infrequently money that is used under the sliding-scale clause in inflating good dividends and in reducing the selling price of gas in accordance with this clause, might be more judiciously employed in increasing the profit-earning power of the undertaking. Were more attention paid to these matters by those responsible for them, the great disparities I have spoken of would not exist, and our industry as administered by companies would be more strongly fortified against competition.

The second point of interest in the analyses I have spoken of deals with the amounts contributed in rates and taxes; and here, also, some striking differences are manifest. In one case a corporation gas undertaking pays 6½d. per ton of coal carbonized; while in another instance, also a corporation gas-works, 1s. 11d. is charged, though the rates per pound probably differ but slightly. In respect to works owned by companies, in one case a payment of 8d. per ton suffices; another company pay 1s. 9d.; and a third 2s. 5½d. per ton.

These differences point to a serious defect in the methods pursued in assessing gas property. To determine what rent a hypothetical tenant should pay, is not an easy task at any time; but the difficulty is enormously increased when, as is sometimes the case, the valuer employed on behalf of the parochial authority is paid by a commission on all increases sustained on appeal to Assessment Committees or Quarter Sessions. Such appeals end not seldom in compromises, intended to appease the opposing litigants, but which leave the merits of the case still in obscurity. The ability of a company to pay is in the opinion of not a few people the measure of what they should be compelled to pay.

Were a principle adopted, applicable alike to all gas undertakings, of charging a fixed percentage on gross incomes, or a sum per million cubic feet of gas produced or per ton of coal carbonized, disputes would be far less frequent than they are, and much costly litigation would be avoided. Any one of the above data would form an easily ascertained basis to work upon, and one that might at any time be re-adjusted without producing friction between the parties interested. There is no reason why gas undertakings should not bear a full share of the rates and taxes of the country; but under existing conditions, and faulty methods of arriving at the amount, many bear more than their fair share. In some cases, there would still be an appropriateness in using the language of the petition published fifty years ago in the first number of the "Journal of Gas Lighting," which said that "the present system of rating of gas-works is unequal, unjust, and oppressive."

The analyses of the accounts of the different gas undertakings which are presented to us from time to time, offer abundant food for reflection; and I know of no better method of discovering the strength or weakness of our separate concerns than by treating our accounts similarly, and making a comparison. This proceeding, when followed by the friendly interchange of ideas which this Association is established to afford (and which I believe it happily fulfils), will conduce to the good ordering and prosperity of the undertakings here represented.

In reference to the remarks in my address relating to regenerative furnaces, I should like to add that during the past winter some interesting experiments have been made by my friend Mr. Glover at the West Bromwich Gas-Works, with a view to increase the amount of coke available for sale. As most of you are aware, previous to the introduction of regenerative furnaces in this district it was no uncommon thing to fire retort-settings with cheap coal slack or low-priced coal. The plan had all the defects of the direct-fired system—imperfect combustion, irregular heats, and large deposits of dust in the flues. The introduction, however, of regenerative furnaces necessitated the use of coke as fuel; and Mr. Glover has been experimenting with a view to return to the use of coal slack. He has designed a producer so constructed as to prevent the dust from passing into the retort-settings. Mr. Glover writes: "The working of the producer is simple and straightforward; and I have no difficulty in maintaining the retorts in two settings of 20 feet long at a high temperature, using 60 per cent. of small slack and 40 per cent. of coke. Complete combustion is effected by my method of introducing the gas and air to the setting; and the old difficulty of large dust deposits has been obviated. While I am satisfied that the system is a great advance on the old one of direct firing, I do not at present feel warranted in extending it. I give preference to regenerators fired with coke." Mr. Glover, I may say, has not thought the matter of sufficient importance to warrant his giving the Association a paper on it; but I am sure you will agree with me in regarding the experiment an interesting one, and the result of it worth communicating to the members. As has been frequently remarked, the record of a partial success, or even of a failure, is sometimes as instructive as that of an undisputed success.

Mr. Lewis proposed a hearty vote of thanks to Mr. Reeves for his address; and this was seconded by Mr. Peter Simpson (Rugby), and carried unanimously.

The PRESIDENT, in acknowledging the vote, intimated that there was time for a discussion on some subject of common interest if any member would be kind enough to suggest a topic or open a discussion.

After a short interval,

Mr. HUNT asked if Mr. Glover would give the members some particulars on the subject of the special producer which he had designed for using coal-slack as fuel.

Mr. GLOVER said he had not intended giving a paper or any detailed statement as to the construction and working of the producer referred to; but he had gladly supplied to the President a short account of the general results obtained. He might, however, say that it was the outcome of a desire to substitute a cheaper form of fuel than coke for the heating of retorts. Coke at the present time was valuable; and if coal slack could be made to take its place without losing the advantages of the regenerative system of heating, a saving might be effected in the cost of fuel. To attempt to use for a trial the usual form of producer installed in a gas-works was out of the question, because of the difficulty of getting the air for primary combustion to pass through a mass of small and compact material. It was necessary, therefore, to have a forced draught; and, to facilitate the charging of the producer, to construct it well in front of the settings to be heated. To prevent the nostrils in the setting from furring-up with finely deposited carbon, due to tarry matters in the producer gas, the raw slack was subjected to a preliminary heating before it was allowed to drop into the active part of the producer, where the air and steam were decomposed. When the charging door (which was flush with the retort-house floor) was removed, this preliminary carbonization of the coal-slack might be seen going on. The quality of fuel now in use was about 60 per cent. small slack and 20 per cent. coke. The use of a proportion of coke had been found almost necessary to keep the fuel open, and to make sufficient producer gas for the work to be done. He was not satisfied with the fuel account, but intended making some alterations in the hope of improving this. There would, however, always be a loss by radiation, as the producer was a steel-cased one, standing in front of the settings. There was another source of loss incident upon the use of bituminous or semi-bituminous fuels, which would be understood by those who had studied the chemistry of the subject. It arose from the gas containing a larger proportion of hydrogen than producer gas made from coke. This necessitated a larger volume of oxygen for its combustion; and, of course, being accompanied by a much larger bulk of nitrogen, the absorption of heat by the secondary air must be considerable. Deposits of dust had been prevented from occurring about the retorts by making the gas-tunnels of ample size, so that the rate of flow was such as to enable the dust to deposit where it would not be felt. The heating of two 20-feet settings of eights had been perfect throughout the winter. He had come to the conclusion that, except under very exceptional circumstances, coke was the ideal fuel for heating gas-retorts when used in a well-constructed regenerative furnace. He would throw out one suggestion for the members to consider; and it was the possibility of primary air short-circuiting in the front of many furnaces or producers as usually constructed. This was the cause, in his opinion, of settings heating up more readily on the side farthest from the furnace. The quality of producer gas from the back of the furnace was better—containing, as it did, a larger proportion of carbonic oxide—than that at the front. This was worth consideration, although he admitted that the furnaces or producers with which they were familiar, worked very well with only a moderate consumption of fuel, and the regulation of the heat was not at all a difficult matter.

A brief conversational discussion followed, in which Mr. George Winstanley, Mr. R. O. Paterson, Mr. W. C. Jones, of Kingswinford, Mr. Percy H. Fletcher, of Evesham, and others took part. The most important point referred to seemed to be as to the cause of different temperatures throughout the length of a 20-feet setting, and the best methods to be followed for overcoming the difficulty.

Mr. PATERSON subsequently asked if Mr. Glover could give the meeting any information as to the process of enrichment described in a paper read before the Institution of Gas Engineers last spring.

Mr. GLOVER said he might briefly remark that so far as naphthalene deposits were concerned, after the plant was started in July last year, stoppages due to naphthalene had disappeared, after working for about six weeks. Considerable relief had been experienced when working in the way described; and cheap enrichment had been obtained by the process.

At the close of the proceedings, the members had tea together.

Innocuous Liquid Acetylene.—The studies of MM. Berthelot and Vieille have shown that liquid acetylene is quite innocuous when it is absorbed by a porous substance like sand. Very light siliceous agglomerates are employed with Kieselguhr base; and these completely fill the steel receptacles in which acetylene is preferably liquefied by cold. When explosion is caused in the mass by impact or electricity, it is localized in the spot where it is produced. It is thought that the labours of these eminent French investigators have brought us to the solution of the problem of lighting by liquid acetylene.

THE CONDITIONS OF TMEPERATURE EXISTING IN ACETYLENE GENERATORS.

At the conclusion of the report of the Society of Arts Committee on the exhibition of acetylene generators at the Imperial Institute last year, given in the "JOURNAL" for the 28th ult. (p. 528), it was mentioned that one of the appendices to the report furnished the results of experiments made with the appliances shown. They were specially directed to ascertaining the conditions of temperature existing in generators of different types, and were carried out by Professor Vivian B. Lewes, whose report thereon is as follows:—

All the generators at present before the public may be conveniently classified under three heads: (1) Those in which water is, by various devices, allowed to drip or flow in a thin stream on to a mass of carbide; the evolution of the gas being regulated by the stopping of the water feed. (2) Those in which water in volume is allowed to rise in contact with the carbide; the evolution of the gas being regulated by the water being driven back from the carbide by the increase of pressure in the generating chamber. (3) Those in which the carbide is dropped or plunged into an excess of water. Attempts were made to obtain definite data as to the temperatures developed when the chemical action between the carbide and the water was taking place under these various conditions.

In all the following experiments, the temperatures reached in the mass of decomposing carbide were measured by the Le Chatelier thermo-couple, the general arrangement of which has been so often described that it is unnecessary to repeat it. A resistance of 19·15 ohms was introduced into the circuit, and the couple was calibrated with every possible precaution; immersion in a paraffin bath, the temperature of which was checked by a standard thermometer, being used to fix the points up to 300° C. The boiling-points of sulphur and tin protochloride were taken to give 448° C. and 606° C., while above this point it is now well known that the line is perfectly straight.

The first set of experiments was made to determine the temperature generated when water drips upon carbide; and considerable difficulty was found in arranging the apparatus in such a way as to make it a fair test of what really takes place in practice. After several failures, the form of apparatus which was finally adopted was as follows: A cylindrical cage of wire gauze for holding the carbide was stood in a porcelain dish, supported by an iron tripod standing in the circular dish which acted as a mercury seal for the bell-jar. The tubulure of the jar was closed by a cork carrying the two glass tubes insulating the thermo-couple, the dripping funnel fitted with a stopcock and a double jet at its lower extremity, and a wide brass tube closed with a cork through which passed the delivery-tube.

Having about half filled the carbide cage with carbide of 91·3 per cent. purity, it was placed in position, standing on a piece of asbestos card in the porcelain basin, and the bell-jar placed over it (the bottom being sealed with 2 centimetres of mercury in the bottom dish); and the cork was put in position—the thermo-couple being raised or lowered until it was at the required depth in the carbide cage, which was then filled up over the couple by dropping in carbide through the brass tube. When the quantity of carbide to be used had been charged in, the brass tube was closed by a cork bearing the delivery-tube, which in turn was connected to a condenser and collecting bottle; and the water was run in in known quantities by the dripping arrangement—readings of temperature being taken every minute.

The charge of carbide employed in every case was half a pound; and a very large number of experiments were made, as it soon became evident that, owing partly to the non-conducting properties of the lime formed, which in many cases crumbled off from the surface of the decomposing carbide and coated the thermo-couple, and partly also to the couple only being about 7 millimetres in length, and so only recording the temperature of a very small portion of the charge of carbide, the temperature readings were often manifestly too low, as actions, such as the formation of tar vapours, could be observed going on in parts of the charge while the thermo-couple was registering a temperature 200 or more degrees less than was known to be needed for the action visibly taking place. Moreover, the streams of water impinging upon the carbide must not flow directly on to the thermo-couple, or it is manifest that correct readings cannot be obtained.

The first dozen experiments were necessary to show the various factors which had to be taken into account in making the determinations; and when the necessary experimental conditions were realized, the determinations began to show something like uniformity in result. The data deduced from the experiments are that, when water is allowed to drip or flow in a thin stream upon a mass of calcic carbide, the temperature rapidly rises, until after about 18 to 25 minutes the maximum is reached—this varying, according to circumstances, from 400° C. to 700° C. It is probable that in some parts of the mass the higher limit is nearly always attained—traces of tar being generally found in the residual lime; and in some cases it is in sufficient quantity to make the lime yellow and pasty, while vapours of benzene and other polymerization products freely pass off with the gas. The maximum temperature rarely lasts a minute; and

the fall in temperature proceeds rapidly from 15 to 20 minutes, and then more slowly until the action ceases.

The readings were in each case taken every minute for an hour; and it will be sufficient here to give one set as fairly typical of the time and temperature factors:—

Thermo-Couple Readings per Minute.

[227 grammes of carbide used, and 330 grammes of water dripped on during the first 40 minutes.]

Min.	°C.	Min.	°C.	Min.	°C.	Min.	°C.	Min.	°C.
1	..	13	284	25	619	37	497	49	423
2	97	14	290	26	616	38	470	50	421
3	154	15	317	27	600	39	430	51	417
4	168	16	452	28	580	40	393	52	414
5	182	17	616	29	580	41	417	53	402
6	204	18	648	30	572	42	418	54	398
7	209	19	674*	31	558	43	417	55	390
8	218	20	644	32	554	44	415	56	387
9	223	21	630	33	553	45	418	57	383
10	244	22	623	34	551	46	417	58	375
11	250	23	625	35	530	47	420	59	373
12	265	24	623	36	508	48	425	60	373

* Maximum reading.

Leaving the question of the temperature developed in this class of generator, another important point is the length of time over which generation of gas continues after the addition of water to the carbide has ceased. The general idea which seems to exist among makers of automatic apparatus of this type is that all they have to do in order to stop the generation of acetylene is to stop the supply of water. This, however, is an utter fallacy, as liberation of gas continues with ever-increasing slowness for sometimes an hour and three-quarters after the water supply has ceased, while the gas so evolved is very considerable in volume. The length of time over which the generation extends will, of course, depend to a certain extent upon the amount of water added, the percentage of carbide undecomposed, and the temperature at which the mass of carbide happens to be when the water supply ceases; while the generation will itself depend upon (*a*) the dehydration of the calcic hydrate first formed, and (*b*) the decomposition of water condensed from the gas present as the temperature of the generator falls.

When water acts upon calcic carbide, the first reaction probably is—

$$CaC_2 + H_2O = CaO + C_2H_2$$

The lime so formed then takes up another molecule of water, forming calcic hydrate—

$$CaO + H_2O = Ca(HO)_2$$

At temperatures of from 420° C. to 430° C., however, calcic hydrate begins to part with its water of hydration; and the affinity for water exerted by any undecomposed carbide still present leads to the reaction—

$$CaC_2 + Ca(HO)_2 = 2CaO + C_2H_2.$$

A large number of experiments were made by placing a known weight of carbide in a generating cylinder, running in a known volume and weight of water in a given time, and carefully measuring the volume of gas for the first 10 minutes, and again when the action had practically ceased, and not more than 1 cubic centimetre of gas was evolved in 10 minutes.

Tabulating the results obtained in the experiments, we obtained the following:—

Weight of Carbide in Grms.	Weight of Water in Grms.	Time Taken to Flow in in Minutes.	Cubic Cent. of Gas in 10 Minutes.	Time to Complete Evolution.	Volume of Gas at End of Evolution.	Percentage of Carbide not Decomposed.
18	9·0	4	2,400	80	2,900	50·0
18	9·0	6	2,300	90	2,800	51·5
18	9·0	8	2,400	70	2,700	53·4
18	13·5	4	2,900	60	3,300	43·0
18	13·5	6	3,000	55	3,500	39·7
18	13·5	8	3,300	65	3,600	37·9
18	18·0	4	3,700	60	4,100	29·3
18	18·0	6	3,600	62	4,200	27·6
18	18·0	8	3,700	65	4,200	27·6
36	18·0	4	4,600	88	4,300	54·3
36	18·0	6	4,650	81	4,350	53·2
36	18·0	8	4,400	57	5,500	52·0
36	27·0	4	5,600	130	6,600	43·1
36	27·0	6	6,000	72	6,650	42·7
36	27·0	8	5,850	61	6,850	41·0
36	36·0	4	7,000	60	7,850	32·2
36	36·0	6	7,100	54	8,400	27·6
36	36·0	8	7,400	49	8,500	26·7
54	27·0	4	5,900	105	6,600	62·1
54	27·0	6	5,800	78	6,300	63·3
54	27·0	8	5,800	85	6,100	62·6
54	36·0	4	6,000	102	6,950	60·0
54	36·0	6	6,300	79	7,500	56·9
54	36·0	8	7,000	109	8,900	48·8
54	54·0	4	6,600	90	8,800	49·4
54	54·0	6	7,700	103	8,900	48·8
54	54·0	8	7,600	105	10,400	40·0

These results are of very great interest, as they not only show clearly the facts already pointed out, but indicate that in any automatic apparatus on this principle the cut-off should be so arranged that at least one-fourth of the total holder capacity is still available to store the slowly-generated gas. Another very important deduction to be arrived at from the figures is the large excess of water over and above the theoretical quantity required to ensure complete decomposition of the carbide by this process; this being to a certain extent dependent upon the form of the generator.

According to theory, 64 parts by weight of carbide require only 36 parts by weight of water to completely decompose them, and convert the lime into calcic hydrate. This would mean that each pound of calcic carbide needs a little less than half a pint of water to complete the action; while a glance at the table shows that, owing to the evaporation due to the heat of the action, half the added water is driven off as steam with the acetylene or left mechanically adhering to the lime. The smallest quantity likely to complete the action would be a pint to a pound of carbide; while in reality the only way is to add sufficient water to drown the residue. If this is not done, the lime forms so protective a coating to the carbide that small quantities often remain undecomposed; and if the residues are thrown into a drain or cesspool, the evolution of acetylene would give an explosive mixture, which, on account of its low point of ignition, would be a serious danger.

Matters of considerable interest to the generator maker are the space occupied by a given weight of carbide, the volume of the lime formed from it on decomposition, and the volume of gas that can be evolved from a given space filled with carbide.

The density of calcic carbide is 2·2, and therefore a cubic foot of solid carbide would weigh 137 lbs. In practice, however, the weight of carbide which can be got into a cubic foot space depends upon the size to which it is broken. With the size commercially sent out, a fair average would be 80 lbs. per cubic foot of carbide space; and this weight of carbide at 5 cubic feet per pound would yield 400 cubic feet of acetylene. One pound of pure calcic carbide yields 1·15 lbs. of slaked lime (1 kilo. of carbide yields 1156 grammes of slaked lime); and the volume this will occupy depends entirely upon the way in which the water is brought in contact with it.

In an automatic generator of the first class, where water drips slowly upon the carbide in sufficient quantity to decompose but not to flood it, the lime swells up, and occupies from 2 to 2·5 times the bulk of the original carbide. When, however, the water flows in more rapidly, the impact of the water beats down the lime, and the space occupied is not so large.

In generators of the second type, in which water rises from below, the weight of the undecomposed carbide above it presses down the lime below, and keeps it in a compact mass occupying about one-half more space than the carbide from which it was formed. With the third type of generator, it really becomes a question of the rate at which the excess of undissolved calcic hydrate settles; and this will be discussed later on.

The large proportion of water vaporized during the evolution of the acetylene at once draws attention to the necessity of arranging all the generator connections in such a way that condensation shall not lead to stoppage of the delivery-pipes. Where a holder capable of taking the full make of gas from the largest charge of carbide the generator can contain is employed, a drip-pipe or catch-box between the generator and the holder is all that is practically necessary; but where a generator is supposed to be sufficiently automatic not to need a holder, every precaution must be taken to ensure complete condensation before distribution.

It must also be clearly borne in mind that the liquid products condensable from the gas are of the most corrosive character both to paint and metal. In order to determine the composition of the liquid products, the gas on leaving the apparatus was made to pass through a Liebig condenser; but it at once became manifest that, with the apparatus I have described, by far the largest proportion of the condensation went on in the bell-jar—the walls running down with liquids and even tar. Another form of apparatus was therefore adopted, consisting of a distillation flask with side tubulure; and the bottom of the flask having been covered with sand, the carbide was placed in it, and the tubulure connected with the condenser—water being run in upon the carbide from a dripping funnel as before. The heat generated caused frequent breakage of the flask; but a considerable quantity of a strongly alkaline yellowish liquid, containing ammonium sulphide, ammonium hyposulphite, and phosphorus compounds, was condensed.

In the second class of generators—in which contact between the carbide and water is brought about either by water rising from below to a mass of carbide suspended in some form of cage, or by a cage of carbide suspended in a moveable bell, which as it falls dips the carbide into water and again withdraws it as excessive generation of gas causes the bell to rise—it was to be expected that many of the drawbacks of the previous class were to be found; and experiment soon showed that, under certain conditions, these generators were as bad as, or worse than, the former.

Phenomena have been frequently observed in the practical working of generators of this class which could only be accounted for on the supposition that the decomposing point of the acetylene had been reached; and the following experimental results fully demonstrate not only that this is so, but the complications which arise from it.

The same bell-jar was used as in the former set of experiments, the arrangement of cork, tube for charging, thermo-couple, and delivery-tube being also the same; but the cage carrying the

carbide was suspended to the cork, while a collar fitted around the neck of the bell-jar admitted of its being made into the bell of a gasholder by suspending it in a glass tank of water—lines attached to the collar being passed over pulleys in a frame above, and so arranged as to allow the bell to be counterpoised. The couple was so arranged as to have a central position in relation to the walls of the holder, and to be about three-quarters of an inch (17 mm.) below the surface of the carbide; the twist of platinum and platinum-rhodium being, as before, about 7 mm. in length.

The charge of half a pound (226·8 grammes) of carbide having been introduced into the cage with the thermo-couple in position, the counterpoise weights were removed; and the cock on the delivery-tube being opened, the bell sank in the water until the carbide cage reached the surface, when the sudden evolution of gas caused the bell to again rise until the rate of delivery exceeded the rate of generation, when it again sank and immersed the carbide—this action continuing until the carbide was all decomposed. The thermo-couple being in the upper part of the charge the rise of temperature is not at first shown; but as the action approaches the neighbourhood of the couple, it registers a rapid increase of temperature, and the action going on is generally rendered invisible by the steam—white vapours and even brown tar fumes coming off from the lower portion of the charge. In from 12 to 18 minutes from the start, the maximum temperature is reached at the spot affecting the couple; and soon after the temperature falls as rapidly as it rose.

The following table gives the temperature readings in four experiments:—

Thermo-Couple Readings per Minute.

Minutes.	Degrees Centigrade.			
	I.	II.	III.	IV.
1	..	..	..	..
2	..	..	..	..
3	..	..	80	..
4	..	..	122	..
5	102	137	170	..
6	119	178	218	..
7	180	200	254	150
8	204	246	287	178
9	227	288	326	233
10	249	338	413	245
11	270	413	727	342
12	298	620	754	393
13	336	734	568	764
14	408	727	466	793
15	464	706	428	807
16	594	701	385	793
17	703	636	347	764
18	654	597	168	725
19	570	478	131	623
20	514	381	..	577
21	413	254	..	594
22	190	..	..	252
23	123	..	..	124
25	96	..	..	..

From this it is seen that excessive heating took place in every case; while in one it was well above the decomposing-point of acetylene. A thin cloud of black smoke was formed immediately around the carbide, while tar vapour poured off from it; and on removing the residue after the experiment, it was found to be coated with soot and loaded with tar. On several occasions, the whole of the charge on removal from the generator, when the maximum temperature was reached, was found to be at a glowing red heat; and it was a striking fact that the smell of acetylene could hardly be distinguished in the strong tarry odour that was evolved.

The moment that acetylene is subjected to the action of high temperatures, changes of great complexity at once commence. These at first are purely synthetical. At temperatures which are low as compared to those which are described above, the acetylene begins to condense to benzene. As the temperature rises, the condensation of four molecules of acetylene yield styrolene; a further increase in the temperature may cause styrolene and benzene to interact, yielding anthracene and hydrogen; and it is probably at this point that the brown tar vapours appear, while naphthalene makes its appearance. These changes, however, still have to be accurately studied. At this temperature, moreover, a fresh set of interactions start. The nascent hydrogen combines with acetylene to form ethylene; and this body, under the action of heat, breaks down to methane and acetylene once more. The earlier actions of necessity lead to a great loss in the volume of the acetylene. Dr. Haber found that 15 litres of acetylene when heated for a considerable period to 638° C. left only 10 litres of gas.

Probably no such condensation as this takes place in an acetylene generator. When the outer layer of carbide decomposes, the gas is evolved so rapidly that there is no time for the heat to act upon it; but as the decomposition spreads into the centre of the mass, the acetylene generated has to pass through the external layers, which, as shown, may be at a temperature above the point of its decomposition; and it is under these conditions that a considerable volume of gas is lost, and the tar, often found in the residue, or distilled out into generator and tubes, is formed. In generators in which excessive heating takes place, this tar is likely to cause considerable trouble, as it is of a very viscous character, and if it condenses in the delivery-tubes causes the lime dust and carbon particles to collect and bring about stoppage.

A still more important evil, however, is to be found in the alteration which takes place in the composition of the gas, and which reduces its illuminating value to a serious extent.

During one of the experiments, samples of the gas were taken as the maximum temperature was approached, and were analyzed, with the following results:—

Acetylene	70·0	..	69·7
Saturated hydrocarbons	11·3	..	11·4
Hydrogen	18·7	..	18·9
	100·0	..	100·0

This alteration in composition reduces the illuminating value of the gas from 240 to about 126 candles.

If the temperatures determined in these experiments are arranged as curves in which time and temperature are taken as factors, it is at once apparent that a very considerable proportion of the generation takes place at a temperature above 600° C., about which point polymerization commences. As benzene forms a large proportion of it, it is carried forward as vapours, and remains suspended even in its passage through the gasholder and delivery-pipes. Benzene requires three times the volume of air for combustion that acetylene does; and the result is that the most perfect acetylene burner shows a tendency to smoke directly any quantity of benzene is formed. When acetylene has been made in a generator at an undue temperature, it carries with it benzene vapour, which, as it commences to condense, assumes a vesicular form; and on coming to the extremely minute holes which form the apertures of the burner, the mechanical scrubbing which it encounters causes the breaking up of the vesicles, and the deposition of the benzene and other hydrocarbons held in suspension by benzene, which soak into the steatite and carbonize. The presence of finely-divided carbon has a great effect in determining the decomposition of acetylene itself, so that a rapid growth of carbon takes place at the burner, and no ordinary clearing of the deposited carbon from the exterior will ever make the nipple fit for constant use again.

It will be found with experience that the prevention of smoking in a burner will be overcome quite as much by attention to the temperature in the generator as to the burner itself; and where a generator is in use which gives overheating, a well-arranged scrubbing apparatus that would get rid of the benzene from the gas would be found a distinct advantage in stopping burner troubles.

At first sight, these results seem an absolute condemnation of the second class of apparatus; but the fact remains that they constitute a very large percentage of the generators on the market, and that the best of these show no signs of the great overheating made manifest by these experiments. The reason of this apparent anomaly is that, under certain conditions, which can be clearly defined, excessive heating is avoided.

The rising bell which draws a mass of wet carbide above the surface of the water is bad from every point of view. But generators in which water rises from below, and so attacks the carbide, can be made safe if the arrangements are such that the water is never driven back from the carbide, and the bulk of carbide is sufficiently subdivided. Under these conditions, the slowly-rising water is always in excess at the point where it decomposes the carbide, so that the evaporation, by rendering heat latent, keeps down the temperature; and, though the steam so formed partly decomposes the carbide in the upper portion of the charge, the action is never sufficiently rapid to give anything approaching a red heat. In order to fulfil these conditions, it is necessary that there should be a holder of considerable capacity, and that the leading-tube conducting the gas from the generator to the holder should be of sufficient diameter to freely conduct away the gas—the water at the same time being allowed to rise in the generator so slowly as to do away with any risk of over-generation. In the best generators of this class, these conditions are more or less approached; and it is unusual to find that the melting-point of tin—228° C.—has been reached in the charge of carbide during decomposition.

Where apparatus of this class are automatic, and have no rising holder to take the gas, it is found that they work satisfactorily when supplying the number of lights for which they were designed; but if they are over-driven, and the action becomes too violent, excessive heating takes place, while the turning off of the gas, with the consequent driving back of the water from the carbide, also has a tendency to cause it. If, however, the water has risen sufficiently slowly, the carbide below the surface has been practically all decomposed; so that the heating only takes place over a limited zone.

The makers of apparatus that are liable to give rise to excessive heating invariably deny the possibility of such an action taking place with their generators; and when it is proved to them that it is so, they fall back upon the defence that, even if the mass does become red hot, there is no particular danger. In such generators, the active danger of explosion only exists while any air is left mixed with the acetylene; and in the form of apparatus which have holders to take the gas as it is formed, the air remaining in the generator is swept rapidly over into the holder, and out of the range of the source of heat. But with automatic generators this is not invariably the case; and the air space in the generators should always be made as small as possible, and some arrangement adopted, if practicable, by which the air in

the generator could be rinsed out by a little of the previously produced acetylene, before decomposition of the carbide by water commences. Under these circumstances, danger from explosion during generation would disappear; but the drawbacks of smoky flames, reduced illuminating power, and choking tubes would still remain.

The generators of the third class are those in which carbide is allowed to fall into an excess of water; and these have many advantages. In such generators, as long as there is water present, and lime sludge is not allowed to accumulate, it is impossible to get above a temperature of 100° C.; while with a properly-arranged tank, the temperature never exceeds that of the air by more than a few degrees. Under these conditions, the absence of polymerization and the washing of the nascent and finely-divided bubbles of gas by the lime water in the generator yields acetylene of a degree of purity unapproached by any other form of apparatus.

One thing that has militated against it is that it is not easy to design a generator which shall be automatic; and as this seems to be the craze from which the generator makers are at present suffering, its advantages have been apparently overlooked by them, though fully recognized by all scientific men. This form of generator, however, though exhibiting the great advantages enumerated above, has the drawback of being one of the least economical in the output of acetylene per pound of carbide used, as the gas having to bubble through the water is rapidly dissolved by it; while in an apparatus in which only the surface of the water touches the gas, the amount dissolved is comparatively small. The result of this is that, with generators of this class, the generation rarely exceeds 4·2 cubic feet of acetylene per pound of carbide, instead of 5 cubic feet per pound. Probably, therefore, from a practical point of view, the generators which are the best for general working are those of Class 2A, which are used in connection with a holder of sufficient size to take the gas evolved from the full charge of carbide employed.

In designing a generator of the third class, the tank containing the water into which the carbide falls should be provided with a false bottom, so as to leave at least from 8 inches to 1 foot of water below the point at which the carbide is decomposed for the lime sludge to settle in; and experiments were made to see the rate at which the settling of the excess of lime took place. In these experiments, known weights of calcic carbide were dropped into a beaker containing a litre of water; and the results obtained were as follows:—

I.

Calcic Carbide.	Volume of Lime Paste Deposited during		Volume of Lime Paste Deposited during	
	30 Mins.	90 Mins.	30 Mins.	90 Mins.
			Calculated for 1 grm. CaC_2.	
Grms.	c.c.	c.c.	c.c.	c.c.
50	480	360	9·6	7·2
50	470	340	9·4	6·8
50	440	350	8·8	7·0
50	470	370	9·4	7·4
40	430	330	10·7	8·0
40	420	320	10·5	8·0
40	400	310	10·2	7·7
40	410	320	10·5	8·0
30	340	240	11·0	8·0
30	320	220	10·3	7·3
30	330	240	11·0	8·0
30	330	240	11·0	8·0
		Mean	10·2	7·6

II.

50	450	340	9·0	6·8
50	440	330	8·8	6·6
50	450	330	9·0	6·6
50	440	320	8·8	6·2
40	390	310	9·7	7·7
40	410	310	10·0	7·7
40	390	300	9·7	7·5
40	390	300	9·7	7·5
30	310	210	10·3	7·0
30	300	240	10·0	8·0
30	240	230	9·6	7·6
30	300	220	10·0	7·3
		Mean	9·8	8·6

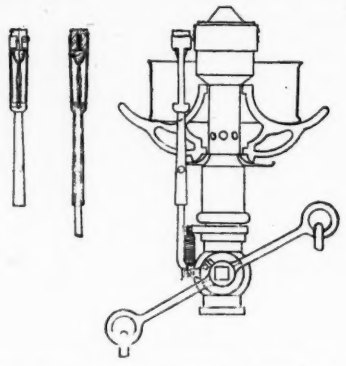
After 30 minutes, the volume of lime was 10 c.c. per gramme of carbide; after 90 minutes, it was 8·1 c.c. per gramme. So that approximately, after an hour's standing, each kilogramme of calcic carbide will give 10 litres of lime sludge, or 1 lb. of calcic carbide will yield 8 pints, which can be got rid of by a sludge-cock at the bottom of the apparatus. The rapidity with which settling takes place is, of course, slightly affected by the form of the apparatus.

The Voelker mantle has been attracting considerable attention in Plymouth and Devonport, where it has been on view. A great many people went to the Plymouth establishment to witness the exhibition.

REGISTER OF PATENTS.

Automatic Gas-Igniter.—Automatic Universal Gas-Igniter, Limited; a communication from J. F. C. Jürgen, of Altona, Germany. No. 3799; Feb. 15, 1898.

This invention relates to a modification of the combined gas-cock, plug, and igniting-tube described in patent No. 30,437 of 1897; and it consists in so constructing the igniting-tube as to form a bunsen burner, from which an intimate and inflammable mixture of gas and air will issue upon the cock-plug being fully turned in one direction, and impinge upon the automatic gas-igniting body—such, for example, as a pillule of porous material impregnated with spongy platinum—which will effect the ignition of the air and gas mixture in a "more certain manner than it would a stream of gas alone, and without the need of accurate adjustment of the igniting body."

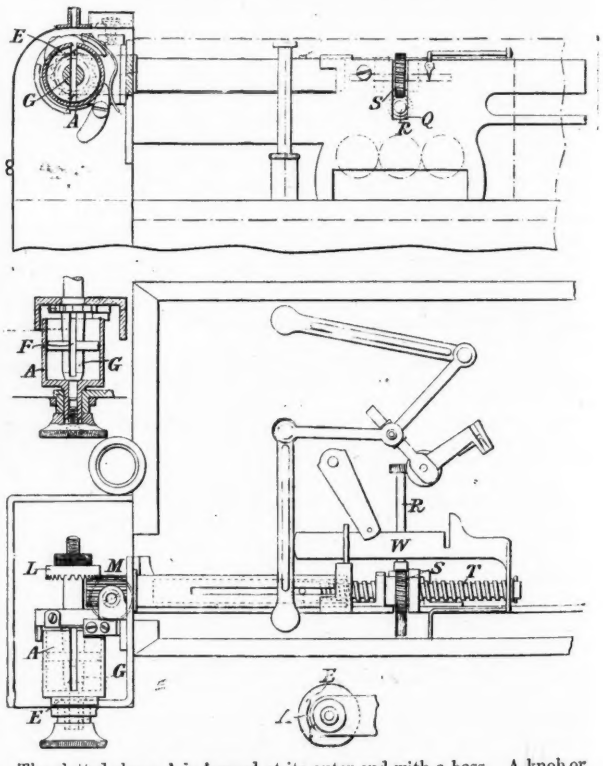


The illustration shows, in side elevation, a combined gas cock, plug, and igniting-tube of the kind described in the 1897 patent, but with the igniting-tube constructed to form a bunsen burner according to the present invention; also a side elevation and vertical section of the upper portion of the igniting-tube.

Coin-Freed Gas-Meters.—Parkinson, W. C., of Cottage Lane, City Road, E.C. No. 4902; Feb. 28, 1898.

This invention relates to "a simple, compact, and effective coin-receiving and price-varying mechanism for operating the mechanism that determines the amount of gas freed or to be delivered by the meter."

The illustration shows a sectional elevation and a plan of the meter (the cover being supposed to be removed to exhibit the coin-freed mechanism); also a central section of the coin-receiving mechanism.



The slotted sleeve A is formed at its outer end with a boss. A knob or handle by means of which the sleeve can be rotated on its axis is fixed on the outer end of the bush; and the sleeve is provided at its outer end with a projection E, whose two edges limit the motion of the sleeve. As shown, this motion is half a rotation; but one-third, one-fourth, or other division may be used. The sleeve is formed with a slot adapted to receive any predetermined coin; and is of such diameter that, when the coin rests on the lower inner circumference of the sleeve, its upper edge remains in the slot.

The coin-pocket consists of a slot F formed through a spindle G on which a disc is fixed. The spindle at its outer end works loosely in the hollow boss of the sleeve A; and a bracket supports its inner end. The spindle is provided with a ratchet wheel, in which gears a pawl forced into gear by a spring, so that the spindle can only be rotated in the forward direction. A guard ring on the bracket prevents the pawl and ratchet wheel being tampered with, and also stops the coin falling out of the pocket until its motion is completed. When the proper coin is inserted through the slot in the sleeve, and into the coin-pocket F, it locks the sleeve and spindle together; so that, on rotating the sleeve through half a rotation, the spindle also is rotated to a similar extent.

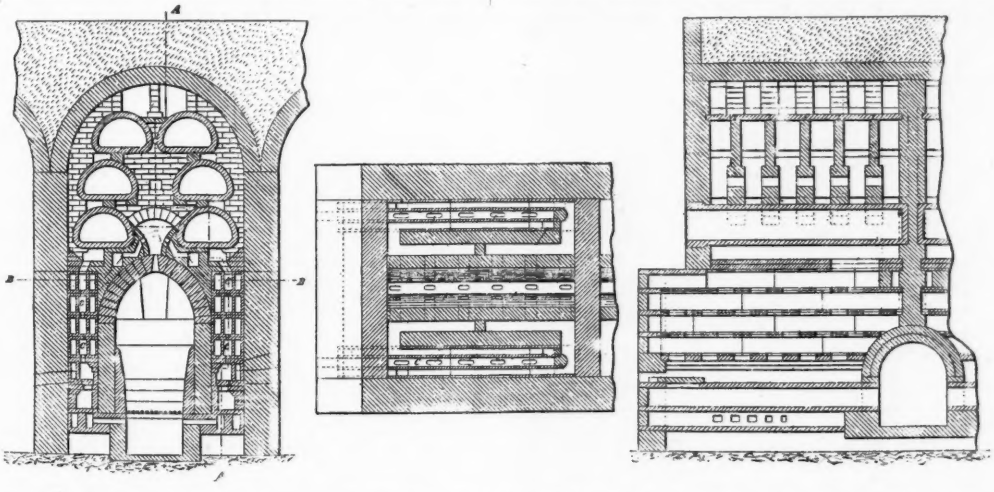
On the end of the spindle G is a readily removable crown wheel L, which gears into a long pinion M on a spindle arranged at right angles to the spindle G, and operating the freeing mechanism. In order to vary the amount of gas to be delivered for each coin inserted, this crown wheel is removed and replaced by a larger or smaller one; the length of the pinion being sufficient to gear with all sizes of wheels within predetermined limits. As shown, the crown wheel is prevented from rotating on the spindle by a key; and is retained longitudinally in position by a boss and lock nuts. The coin can only be inserted when the sleeve is in its proper position; and the sleeve must be rotated through an integral division of a rotation so as to bring a coin-pocket always opposite the coin-shoot. The coin, when the sleeve comes against its stop, is deposited in a receptacle underneath.

A worm Q is mounted on the unit index spindle or arbor K, and gears with a screw-threaded pinion S mounted on the threaded part of a sliding screwed rod T; the pinion being held in position laterally so that, as it is rotated, it imparts a longitudinal or axial motion to the rod. Connected to and partaking of the longitudinal sliding motion of the rod is an index pointer working over an indicating dial V, so as to indicate the amount of gas to the credit of the consumer. The back end of the rod T slides freely in the end of the spindle on which the long pinion M is mounted, and in which it is prevented from rotating by a pin. The penny mechanism thus rotates the rod T by means of the long pinion M, and traverses it through the screw-threaded pinion S, which is held by the meter-registering mechanism. When gas is being consumed, the meter-registering mechanism operates the pinion to cause it to return the threaded rod towards its initial position. The rod T operates the slide W, having a projection that (as the rod returns to its initial position) acts on the arm of the valve through which gas is supplied to the meter so as to close it.

Regenerator Retort-Settings.—Winstanley, G., of Coventry. No. 2797; Feb. 3, 1898.

The patentee's principal objects are "to effect a better mixing of the gases generated, and an improved method of conveying the air for combustion." This is attained by the employment of tiles of special shape in the construction of the regenerator settings described in patent No. 4212 of 1884, and by means of which "a sure heating and a better and more perfect control of the air and fire combinations are obtained."

The inventor shows a vertical cross section of his retort-setting, and vertical and horizontal sections on the lines A and B respectively. He also appends a sheet of drawings showing the different shapes of tiles employed in it. He remarks that the regenerator air and fire tiles are arranged with deep sides, and are made either in separate parts, or as a whole in suitable lengths, to meet the various sizes and widths of arches; and so formed as to produce the present hit-and-miss fire openings following each alternate course. The special features in the improvements are: Greater depth of air and fire spaces; the formation of rows in single pieces or in whole parts of 18 inches and upward in length; making the air and alternating openings with a special form of tile giving greater area than those at present in use; a new form of opening for the drop fire as it descends from the setting into the regenerator, this also being made of a special tile having an elongated opening with its sides made to fit perfectly into the air-tiles by tongued and grooved slots, either curved or straight or both; also a new and special stop-brick to form sub-divisions in the air-ways and in alternate courses "made to suit each such part as it is applied to, to prevent the air from short-circuiting, and to produce a perfectly air-tight joint and a clear air circulating-passage in the various parts applied;" and the collecting and bringing the whole of the heated air in any quantity to any given point. By means of the specially designed bricks, the heated air is conveyed to any desired point, and in such quantity that, on contact with the carbonic oxide issuing from the generator, it is converted instantly (at the moment of contact) into carbonic acid—"thus producing an intense white heat, and so doing away with the combustion-chamber so common in most regenerative systems."



Gas-Meters.—Richmond, E. W. T., of Romford, Essex. No. 7686; March 30, 1898.

This invention relates to meters in which the measurement of the flow of gas is accomplished by the determination of the time-equivalent of the gas-flow, while a cock remains open. Concerning it, the patentee remarks: "In time gas-meters which have been hitherto proposed, the opening of a gas-cock liberates clockwork mechanism, and the closing of the cock stops the clockwork. In most mechanisms of this class, the rate of indication on the clock-dial remains constant, whether the gas-cock be opened to a small extent, to pass a feeble flow of gas, or to a large extent, passing the maximum possible. It has been proposed to alter the registration of the time-rate of flow by using a pendulum clock, whose length of pendulum was varied with the change in the rate of gas supply. The object of my invention is to dispense with pendulum clocks (which are objectionable for this purpose), and to provide an automatic means for varying the rate of indication on a dial showing the quantity of gas supplied, with the rate of supply. My invention consists in applying to a clock mechanism, whose time-rate remains constant, means for automatically varying the rate of indication on the clock dial, with the quantity of gas being delivered through a cock, controlling the gas flow."

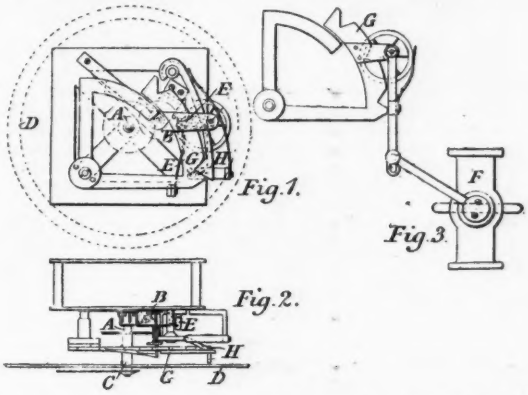


Fig. 1.

Fig. 3.

Fig. 2.

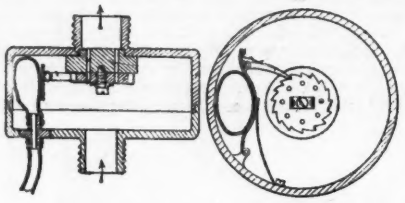
Fig. 1 is a front elevation of this clock-operated gas-measuring device; fig. 2 is a plan; and fig. 3 is a detail view showing a form of clock stopping and starting device.

On the hour spindle A of an ordinary balance-wheel clock is fixed a special rate varying pinion, which gears with a spur wheel on an auxiliary spindle B, capable of longitudinal travel; its position being controlled by a spring and step cam. On the spindle B is a long pinion, which gears with a wheel on a sleeve C, carrying an indicating hand moving over a dial D, and showing either the quantity of gas supplied or the number of hours supply to be paid for. The pinion on the hour spindle A has pin teeth of varying length (some short and some long), arranged so that one end the pinion has (say) twelve teeth, and a little further along six teeth. If more than two rates of supply are to be recorded, further variations in the number of teeth on the pinion at each point must be provided. A ratchet pawl E prevents rotation of the hand when it is free, on account of the teeth of the wheel on B not being in gear with the rate varying pinion during part of its revolution. In connection with the gas-cock F is an arm which operates a quadrant G, provided with a centering contrivance. This consists of a V pawl H pressed into one of the centering grooves by a spring. One arm of the quadrant is provided with a step cam, against which the end of the auxiliary spindle B is pressed by another spring. When the gas-cock is full open, the first step of the cam is causing the wheel on the auxiliary spindle B to gear with the greatest number of teeth on the hour pinion spindle A; and therefore the registering hand is being driven at its maximum rate. When the gas is turned down, the next step of the cam is brought opposite the auxiliary spindle B, which is then pressed against it, so as to move its wheel along the rate-varying pinion to a place where there are fewer teeth on the latter's circumference. The rate at which the registering-hand is now driven is less than the maximum rate in proportion to the less quantity of gas being passed by the cock. A suitable number of steps may be provided on the cam corresponding with the various rates of supply decided on to suit different conditions

Lighting and Extinguishing Gas-Flames from a Distance.—Knapp, E., of Cologne. No. 8469; April 9, 1898.

The ignition and extinction of the gas-flame is effected by the step-by-step rotation of a disc-valve having perforations so arranged that in one position of the valve they correspond with channels leading from a gas-supply chamber to the burner, so as to allow of the passage of gas, which is ignited by a constantly burning lighting jet; and in another position they are situated intermediately between such channels, so as to cut off the supply. The improvements consist in the employment of pneumatic devices for effecting the rotation of the valve.

The hermetically-closed casing shown is fitted with a burner nozzle, closed inside by a plug having through it a series of channels, by which gas can pass to the burner, and which has rotatably mounted on its inner



surface a disc valve formed with ratchet teeth round its periphery and having perforations so arranged in a circle that, when the valve is rotated through a distance equal to one tooth of the ratchet by means of a pawl, the perforations are brought so as to supply gas to the burner; while when the valve is shifted the distance of another tooth, the holes are situated between the gas channels, and are consequently closed by the body of the valve. The pawl is actuated for this purpose as follows: The casing contains a flexible bag from which a small tube leads through the casing to the outside. If, now, air be forced in so as to expand the bag, it is made to press upon a lever, which carries the ratchet, and thus effects the partial rotation of the valve. On the air pressure being then allowed to escape, the bag will collapse; and the lever and pawl will be moved back to their original position by a spring.

Regenerator Furnaces for Gas-Retorts.—Simmonds, H., of Colne. No. 7356; March 26, 1898.

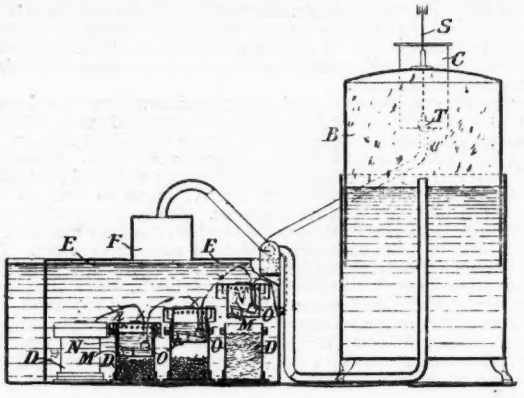
This invention consists essentially in the construction of the regenerators of retort-furnaces with a self-contained division wall, which divides the air-flues from the waste-gas flues; the horizontal tiles or bricks which form the air and waste-gas flues abutting thereon.

expansion and contraction and ensures a perfectly tight division wall between the air-flues D and the waste-gas flues E, so as to reduce to a minimum "the evils of short circuiting."

The air supply is admitted at M at the front of the setting; travels upwards by the zig-zag passages; becomes regenerated by contact with the vertical division wall G; enters passages passing over the crown of the producer; and burns with the gas issuing from the nostrils of the producer. The products of combustion circulate round the retorts, and afterwards enter the waste-gas flue E of the regenerator through suitable openings; then pass downwards to the main flue F, giving up their heat as they flow to the vertical division wall G, from which the heat is transferred to the inflowing air.

Acetylene Gas-Generators.—Schwass, A., of Berlin. No. 25,016; Nov. 26, 1898.

According to this invention, the calcium carbide is confined in a series of practically air-tight receptacles, which are consecutively opened automatically according to the amount of gas required. The advantage claimed



for the arrangement is that the whole of the carbide is under water at the time of release, and practically air-tightly enclosed; but as soon as generation commences after the opening of a cartridge or receptacle, the cover rises to make room for the gas released.

When the carbide receptacles D have been placed in the generator, and the bell E closed down into its operative position, the valve T is opened,

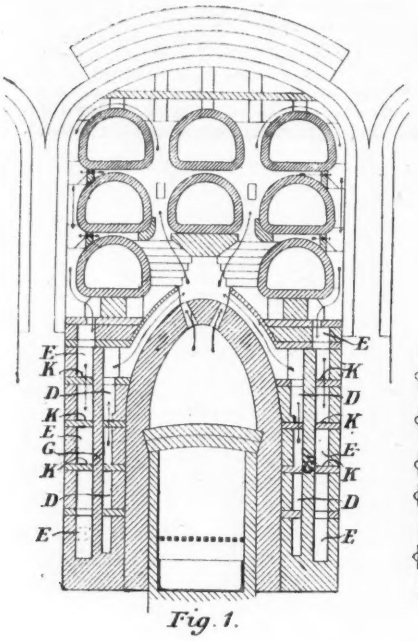


Fig. 1.

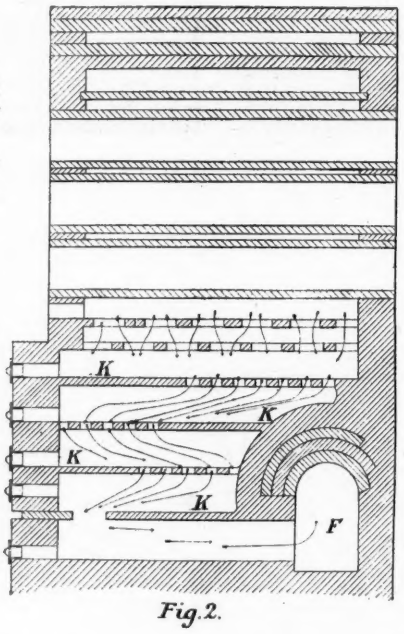


Fig. 2.

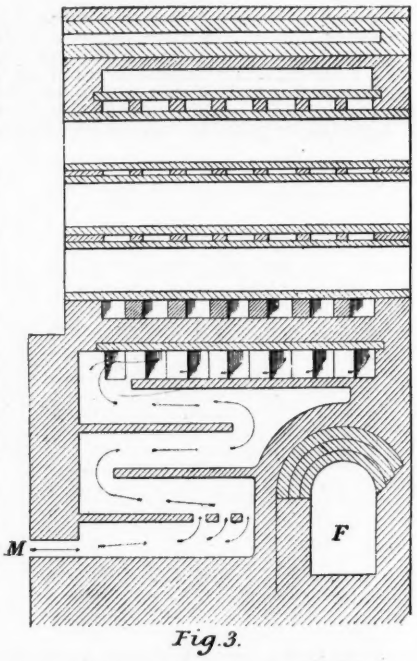


Fig. 3.

Fig. 1 is a cross section through the regenerator and one set of retorts; fig. 2, a longitudinal section through the waste-gas flues; and fig. 3, a longitudinal section through the air-supply flues, for the regeneration of the air.

The grate, the producer, the combustion-chamber, and the retorts are constructed and set in the usual way. Between the air-inlet flues D and waste-gas exhaust-flues E, which lead to the main flue F, is a division wall G, which is self-contained. The air-inlet flues are formed of a number of horizontal zig-zag passages, built of bricks or tiles, which abut against one side of the division walls, but do not enter or join them—thus both the horizontal division walls and the vertical division wall are free to contract or expand without interfering with one another,

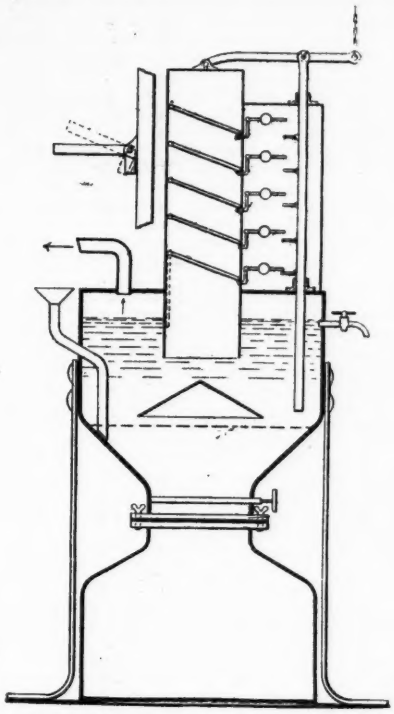
The waste-gas exhaust-flues E are constructed in a similar manner to the air-flues—horizontal passages being formed by the divisions K (of brick or tiles) for breaking up the waste gases on their downward flow to the main-flue F. These horizontal divisions are built against, but not into, the vertical division G, leaving both free to contract or expand.

This vertical division wall being self-contained, permits of the free

and water is allowed to flow to the first carbide receptacle. Entering the receiver, the water will weight the lever N and throw it over—thus opening the valve M. As soon as this has taken place, the water flows on to the carbide, and generation of gas commences. The acetylene first passes up in the cylinder D, and finding its way through openings in the cover, helps to force the water out through the valve M, and simultaneously decrease the weight of the drum and fill it with gas instead of water. The drum consequently begins to rise, and provides a gas-generating space within the cylinder D below the cover, so that it finally attains the position shown. The gas now begins to bubble up through the water in the generator, and collects in the dome F; passing thence to the gasholder bell B. The bell thus rises, and allows the valve T to close by gravity the water supply from C, owing to the fact that, as the bell rises, the cord S is slackened. When the gas in the bell has been exhausted, the latter sinks, and the valve is again opened. But this time the water passes through the chamber O of the exhausted carbide receptacle, along another similar pipe to the next one, and the operation is repeated; and so on, until all the carbide receptacles have been exhausted.

Acetylene Generator.—Falbe, O., of Berlin. No. 24,682; Nov. 22, 1898.

This acetylene generator has an automatic feed-device (acting in sections, corresponding to requirements), consisting of a number of plates, arranged one above the other, to carry separate quantities of carbide, and pivotally attached to one side of the feed-device. On the other side, they are supported by releasable lever catches in such a way that, after being released, they drop down on their axis of rotation, and discharge the carbide carried



on them into the water-chamber of the generator. The releasing of the catches is effected, on the gasholder bell descending to its lowest position, by means of catches carried by a single bar (as shown); the distance apart of the catches being calculated in such a way that, on each downward movement of the holder, only that one feed-shelf is released which is at the moment the lowest undischarged. There is at the under end of the generator a separate removable sludge container and a device for shutting it off, with the object of allowing it to be removed and cleaned without interrupting the working of the apparatus.

APPLICATIONS FOR LETTERS PATENT.

3682.—Robinson, J. V., "Acetylene apparatus." Feb. 20.
3683.—Simmance, J. F., "Lighting and extinguishing gas-flames." Feb. 20.
3689.—Elcock, C. E., Allworthy, S. W., and Jackson, N., "Acetylene gas generator." Feb. 20.
3692.—Curtis, F. H., "Automatic fluid measure." Feb. 20.
3706.—Dougill, A., and Marks, J., "Carburetters for use in gas or other engines." Feb. 20.
3707.—Harper, H., "Gas-globe holder." Feb. 20.
3714.—Darby, G., "Supports for incandescent gas-mantles." Feb. 20.
3839.—Tavernor, J. M., "Generator for acetylene gas." Feb. 21.
3840.—Tavernor, J. M., "Acetylene-lamps." Feb. 21.
3850.—Price, H. A., and Turner, H. C., "Gas-stoves." Feb. 21.
3858.—Powers, V., "Acetylene lamps and generators." Feb. 21.
3884.—Savelsberg, C., "Apparatus for lighting and extinguishing gas." Feb. 21.
3938.—Bateman, F. E., "Burners for incandescent gas-lamps." Feb. 22.
3948.—Abel, C. D., "Piston for gas or oil motor engine cylinders." A communication from The Gasmotoren Fabrik Deutz. Feb. 22.
3949.—Berry, S. H., and Riddle, E. H., "Production of acetylene gas." Feb. 22.
3979.—Overfield, W. A., "A combined gas and coal fire-grate." Feb. 22.
4006.—Harper, J., and Co., Ltd., and Retallack, C., "Improvements in cases of oil and gas stoves." Feb. 23.
4037.—Lloyd, G. H., "Gas-engines." Feb. 23.
4043.—Bourgeois, F. J., "Non-explosive acetylene lamp." Feb. 23.
4054.—Boult, A. J., "Acetylene gas generators." A communication from M. de Lasserve. Feb. 23.
4087.—Sunderland, F., and Marshall, G., "Carbide supply holders for acetylene generators." Feb. 24.
4093.—Sunderland, R. H., and Marshall, G., "Acetylene gas generators and lamps for burning such gas." Feb. 24.
4115.—Caldicott, J., "Acetylene gas generators." Feb. 24.
4223.—Berger, H., "Generating acetylene gas." Feb. 25.
4243.—Duncan, J. H. H., "Incandescent bodies suitable for use with gas and other burners." Feb. 25.
4250.—Streubel, C. G. A., "Cocks for gas-burners." Feb. 25.

Gas v. Electricity at Hampstead.—Gas is not to be ousted from Hampstead, though the Vestry have an electric light undertaking; for, in the estimates for the ensuing year, £6600 is set aside for public gas lighting, and only £2100 for arc street lighting.

CORRESPONDENCE.

[*We are not responsible for the opinions expressed by correspondents.*]

Mr. A. E. Broadberry and the Water Gas Committee's Report.

Sir,—In your last issue (p. 523) Mr. A. E. Broadberry, in the course o some remarks on the report of the Water Gas Committee, points out that there have been no deaths from gas poisoning in the district supplied by the Tottenham and Edmonton Gas Company, though about 2000 million cubic feet of a mixture containing 50 per cent. of carburetted water gas have been distributed. He shows that, with this distribution of gas, and a death-rate from gas poisoning equal to that in Boston or San Francisco, a large number of persons would have been poisoned, to judge from a table which I compiled for one of the appendices to the report. As no one has been killed, he argues that the apprehensions based on the American statistics are removed by practical experience in this country.

Mr. Broadberry's facts would certainly suffice to dispose of the idea that the distribution of gas such as is supplied by the Tottenham Company involves risks of the same degree as those incurred by the consumers of the gas now being supplied in Boston and other American towns. I should like, however, to point out clearly that this idea is not suggested, either in the report or in the appendix more particularly referred to. Mr. Broadberry's argument ignores the fact that the gas distributed by the Tottenham Company is not the pure, or nearly pure, carburetted water gas used in Boston, but a mixture with 50 per cent. of coal gas. The rough general conclusion arrived at in the appendix (p. 73) is that "the increased loss of life by accidents has been about proportional to the cube of the relative increase in the proportion of carbonic oxide."

According to this rule, the average number of accidental deaths to be expected with a gas distribution of the quantity and composition mentioned by Mr. Broadberry would be only three, and not fifty or sixty, as he supposes. Considering the smallness of this number, and the fact that accidents from gas poisoning, like other accidents, occur at very irregular intervals, it would not be safe to conclude too much from the absence of accidents at Tottenham; and it is surely better to judge from all the available experience, both in the United Kingdom and America. This experience undoubtedly indicates that a serious increase of risk attends any considerable increase in the percentage of carbonic oxide in lighting gas, unless increased precautions be taken in connection with the supply of such gas, particularly in small-sized bed-rooms.

Oxford, March 3, 1899. J. S. Haldane.

Sulphate Working at Widnes.

Sir,—In your issue of Feb. 21, Mr. Tysoe asks for an explanation as to how a superheater in a sulphate of ammonia plant can affect the quantity of acid used, and at the same time remarks that a properly-constructed sulphate plant will take all the ammonia out of the liquor with a given quantity of acid of a definite strength, without the aid of a superheater—*i.e.*, if sufficient steam be used.

I do not know what Mr. Tysoe's idea of a properly-constructed sulphate plant may be; but I do know that, with the ordinary continuous still such as is in use here, where the outgoing gases to the saturator are met by the incoming liquor, if the latter is cold the effect is to reduce the temperature of the liquor in the saturator to such a degree as to interfere with the perfect crystallization—causing the sulphate to be highly charged with free acid. No amount of extra steam, such as the stills would take, has ever prevented this—in fact, with our existing plant, without the aid of a superheater, we could not make a marketable sulphate of 24 per cent. ammonia.

Another way in which the superheater has effected a very considerable saving in acid may be a condition peculiar to these works, on account of the impure quality of the pyrites acid used. The quantity of acid employed prior to the introduction of the new superheater—viz., 1 ton 3¼ cwt.—was high, and was due in a measure to the abnormal amount of skimming required, and consequent waste. Now, with the greater heat in the saturator, the anthracene is much more effective in taking up the arsenic—*i.e.*, it can be skimmed with much less waste of mother liquor, thus not only saving acid, but also increasing the yield of sulphate.

The steam for the sulphate plant is furnished by the boilers supplying the rest of the works, and the proportion of cost debited. Breeze only is used for firing; and were I to estimate this at 1s. 6d. or 2s. per ton—its value in many works—the cost of fuel would be reduced. Still, the weight of breeze per ton of sulphate is high; and the 100 feet of pipe between the boilers and the plant is to an extent responsible for this.

From another works where my superheater was some few months ago substituted for one of a less effective type, comes the report that the proportionate saving in fuel is greater than that at Widnes—due to more favourable local conditions, and some improvement effected in the construction of the superheater itself. The saving in acid is also stated to be very considerable. The actual figures under both these heads will doubtless be shortly forthcoming.

Mr. A. F. Ward requests that I should amplify the heads of costs, such as gas, water, general charges, superintendence, depreciation, repairs, cartage and carriage, and the cost of purifying the spent gases. As these matters have absolutely no bearing on the question—*i.e.*, whatever they may be, they would be practically the same with the new as with the old superheater—I have not gone to the trouble to take out the particulars. With regard, however, to my figures for fuel, bags, packing, and loading, which this gentleman stigmatizes as "outrageously low," I have nothing to say, except that I have before me the details of cost of a well-known firm of sulphate makers in Scotland, whose figure for wages is the same as mine, and that for packing, loading, &c., less.

Mr. Fletcher W. Stevenson, in the concluding paragraph of a letter in your last issue, casts an aspersion which at once precludes me from taking further notice of this or any subsequent communication that may emanate from him until the offensive passage is withdrawn.

Widnes, March 3, 1899. Isaac Carr.

Where is the South-West Contingent?

SIR,—The above question is asked in the course of the editorial comments upon the recent meeting of the Southern Association (*ante*, p. 358), and also answered by the remark that "they could not keep their own show open, and it is hardly to be wondered that most of them continue to be mere absentee members of the Amalgamated Society." At the same time, a suggestion is made as to whether the attraction of the Committee meetings cannot be extended to the ordinary gatherings; and the President of the Association, in his Inaugural Address, proposes that advance copies of papers to be read should be furnished to the members, in order to increase facilities for fully discussing the same. All of which comes round to the now familiar lamentation, which has spread far wider than the area covered by the District Associations of Gas Managers, as to the difficulty of getting papers in the first place, and of securing adequate discussion in the second. The last named is partially, but not wholly, due to scanty attendance of members.

Let me at once disclaim any intention of entering upon a defence of the old South-West of England Association or its members. On previous occasions, I have dealt with the disadvantages, geographical and otherwise, that obtain in that district, and have also raised the question of whether the details of the gas industry are of a sufficiently wide extent to admit of some ten addresses and four to five times that number of papers and discussions per annum, without a considerable amount of repetition and want of novelty. I can write with a special knowledge of that district, extending over many years; and as there is no reason for concluding that the most awful examples of absentee members are to be found between the S. and W. points of the compass, the observations now offered, though based on this knowledge, may be capable of general application. But I would like to remark, in passing, that, with a fair consideration for difference in circumstances, the South-West contingent can claim that they have taken their share in carrying on the work of the Amalgamated Association—as witness the list of officials and the reports of proceedings. A resident in Somerset or Devon, some five hours distant from London, can demand some indulgence in respect to attendance, as compared with a member who is located within a 30-minute radius from the Holborn Restaurant; and bearing this in mind, the South-West members are always adequately represented. In the report that appeared in the "JOURNAL" on the 14th ult., the total number of speakers was twelve, of which three were old South-West men. As the number of members of the Southern, at the time of the amalgamation, was more than double that of the South-West Association, there is, though perhaps not a proportionate showing, still a fair representation of the latter when distance from the place of meeting is considered. This also applies to previous reports.

It may be that the absence of the charm of novelty in the district meeting, and also the evident fact that the Association is well on its feet, has led some members to take less interest, and to feel that their presence at the meetings is not so essential to the well-being of the Association as in the early days. Perhaps the localities which afford special inducements for a visit to those who have never "been there" before, have now been covered. But there is another reason for the dwindling attendance at gas managers' meetings besides indolence, or indifference, or the want of special attractions, which I regard as an important factor, though it appears to have escaped notice, and that is the altered circumstances at gas-works. Speaking in a general way, is it as easy to get a day or a day-and-a-half off now as it was in the early days of the British Association of Gas Managers? We remember the familiar faces—many, alas! now passed away—of those who, year after year, set aside the whole of the second week in June for the Association meeting, and could manage two or three days off in addition, if needed, for their District Association. Could they do so now? Gas managers never were exactly their own masters; but during the last decade or two their duties have been enormously added to, without any adequate increase of assistants or of remuneration. We all remember the daring bare-backed rider in the country circus, who, gradually approaching the shape of an inverted T, takes up one prancing steed after another, till he is straddling across six horses, and controlling six or eight more in front, to the frantic delight of his rustic audience. The average gas manager is much in the position of this man. Twenty years ago, he found that the ordinary carbonizing, purifying, and distributing arrangements, with the extensions incidental to a normal 4 or 5 per cent. increase, afforded full occupation; but one thing after another has been added. Generator furnaces and water gas render frequent visits to the retort-house a *sine qua non*. The manufacture of sulphate, formerly the exception, is now the general rule. The sale of coke and tar, originally chiefly wholesale, has developed into an important retail branch, and includes breaking, sorting, and delivering coke, the manufacture of tar-asphalte, and so on. The interesting little experiment of letting stoves on hire has expanded into a department that calls for nearly as much time and attention as the rental-book. Then there is the gas-fitting department; and the latest addition to the team is the incandescent light—a horse with excellent going powers, but requiring continual and steady control. In large undertakings, responsible heads of departments can take off a share of the labour from the manager; but in the small and medium-sized works, the manager is to a great extent the foreman of each department, and must hold all the reins himself.

During the early days of the Association, the majority of the members accepted the Secretary's printed agenda as a personal communication, and acknowledged its receipt as such—stating their intention to be present, or the reason of their absence. During the period which the "JOURNAL" would probably characterize as the expiring years of the show, a considerable number of apologies for absence, also giving specific causes for absence, were received; and with the exception of ill-health or affliction, the reasons were all connected with increase of business and in details. If every absentee from the Southern Association could be made to take an affidavit as to the cause of his absence, I venture to think that the aggregate results would not be sufficient to support a general charge of negligence or indifference to the interests of the Association. A very small proportion, if any, would have spent that particular afternoon in cycling or any amusement of the kind that is popular among those who have the opportunities and means of enjoying elegant leisure. With very few exceptions, it would be found that the absent members were all at work superintending operations, in the office, or among their customers. All these modern improvements mean largely increased calls on the manager's time and attention, in the way of personal interviews, answering inquiries, arranging details, &c.; and it is no wonder that he cannot put in an appearance at the Association so regularly as he would like, or as he was wont to do.

Turning to the subject of Committee meetings, it is a fact that the attendance is far better than that at the ordinary meetings. In the latter case, it may run to one-fourth of the full list of members; but I have known such a thing as a full attendance of Committee men, and in any instance the absentees are a small minority. It is, however, important to remember that the Committee are selected from the most regular attendants at the ordinary meetings, and from those who do the most work in the way of papers and discussions. It is a mistake to suppose that the Committee men attend their private meeting with a better degree of regularity than they do the ordinary meeting. I have frequently heard it said at Committee meetings, "We run the Association;" and an ordinary meeting, without the Committee and the *ex-officio's*, would indeed be a case of "Hamlet" with the principal character left out. No wonder, then, that the informal discussions that are held as soon as the business proper of the Committee has been completed, assume a character not less interesting, and probably more so, than those at a so-called full sitting of members. A Committee man probably feels more keenly a sense of his responsibility than the average member, and also that he has a definite work. If the ordinary member could be made to feel that his presence at the ordinary meeting is as necessary to the well-being of the Association as the Committee man feels with regard to his little niche on the finance, the general purposes, or other department that has probably been found for him by the astute Secretary, he would likely make a stronger effort to attend. The fact is that, while the difficulties of arranging for a day or a day-and-a-half off duty are greater, the inducement to attend is if anything less. Then the attraction of the discussion at the Committee meeting lies in its spontaneous character. There is no talking to order; but the subject turns upon, and is suggested by, the latest news of the day. For example, if an Association Committee meeting was held to-day, the probability is that the vacating of the chair would be followed by an animated discussion on the attitude of the Government towards water gas, as indicated by the recent report to the House of Commons.

Again, while all are agreed as to the desirability of the published report, the average gas manager will talk more freely and naturally when the "knight of the pen" is not present. From the very nature of his business, he has acquired an habitual caution of speech. He has to deal with all sorts and conditions of men, and knows that his remarks may go beyond the "JOURNAL," and get introduced into company and interpreted in a manner that was never intended by their author; and so "the chiel amang ye takin' notes" exercises some influence as regards stiffness and meagreness of discussions. Substitute for the Committee a gathering of ten or a dozen men, who are also to a greater or less extent old friends, met to inspect a new process, or on some other common object, and the occasion will be characterized by the same "feast of reason and flow of soul." Some of the American Associations have adopted the plan of holding a private session at each meeting; and it would be interesting to know how the character of the discussions, under such circumstances, agrees with the experiences above related.

The President of the Southern Association suggests that the plan of issuing proofs of papers in advance might help to stimulate discussion; but he fears that some would read the paper and then be satisfied to stay away. My fear is not so much on account of those who would read the proof, as that the majority would not trouble to read it at all. The absentee members, except in particular cases—such as that of a gentleman whose physical infirmity prevents his attendance—are not careful readers of the proceedings. Some of them do not even master the contents of the *agenda* paper. The man who will take the trouble to carefully peruse the proof may be relied upon to turn up at the meeting and take part in the discussion, if he possibly can. The issue of advance sheets has been tried on several occasions; and if specially addressed to a member who is in such a position that he can contribute information, and accompanied by a personal appeal, it will usually draw a carefully prepared statement. The broadcast sowing of proof sheets has, however, already been found, in many instances, to yield no appreciable crop.

Some improvement might be effected on the usual style of official programme, in which brevity is studied at the expense of everything else; and this baldness of style appears to extend to the titles of papers, which are frequently cut down to one word. By the exercise of some ingenuity, the title of the paper might be made to serve the double-barrelled purpose of a bait to attract attendance, and of an indication to the prospective debaters of the lines to which their eloquence might be directed. Take, for example, the following item, which is not an exaggerated specimen: "A Paper on 'Carbonizing' will be read by Mr. Alpha Beta." The only attraction in this announcement is the personality of the author. Neighbours ask each other if it is worth while going to hear Mr. Alpha Beta's paper, what he has been doing in the way of retort-house apparatus, or, if he is a new member, they discuss his personal qualifications for the performance. The author's style, and so on, are canvassed, and especially if he is likely to let somebody or some process "have it hot." Suppose we attend the meeting, the same thing is noticeable; and during the preliminary hand shake we hear a great deal about Mr. Alpha Beta, and very little about his subject. Would it not be possible to enhance the attraction already in all probability attaching to Mr. Alpha Beta's ample personal qualifications, by endeavouring to arouse some interest in his subject. This might be done in some cases by a fully descriptive title, in others by a brief synopsis—in each instance taking care to indicate the debatable points, so that members might not be under the disadvantage of having to speak without book, and be saved the annoyance of looking up tabular or other matter which may prove to be outside the range of the discussion. Suppose an addition something like the following was made to the above title: "The author will describe his improved arrangement of ten inclined retorts in one bed, as erected by him last season, and worked for six months. He will quote figures as to first cost, also working expenses, and will compare the same with the similar charges for the horizontal system. He will direct attention to modifications necessary to meet the characteristics and various kinds of coal, and will conclude with a few practical hints on every-day working." This would not render the *agenda* unnecessarily prolix, nor unduly swell the printer's bill; but it would meet the objections above noted.

With regard to discussions, the shortest are not necessarily the poorest. One or two popular subjects may be instanced that would bring a quarter of the members present to their feet, with the result that some of the best and most capable speakers are crowded out. The President, as a rule, is expected to limit the time occupied by the discussion. Sometimes he has to resort to personal blandishments to spread it over the allotted time, and on other occasions he has to cut it short. He would be greatly assisted in the proper discharge of these rather delicate duties, if provided at the outset with a list of the names of those prepared or willing to speak. With this before him, he could impose a time-limit on each speaker, or make such other arrangements as would admit of the strength of the members being fully drawn out, without useless repetition or waste of time.

NORTON H. HUMPHRYS.

Salisbury, March 1, 1899.

PARLIAMENTARY INTELLIGENCE.

HOUSE OF LORDS.

Friday, March 3.

MUNICIPAL TRADING.

The EARL of WEMYSS presented petitions against clauses in Private Bills respecting Municipal Trading. He explained that the petitions numbered 142, from different parts of the country, and they came from Chambers of Commerce, gas, water, and electric lighting companies, employers of labour, property-owners, ratepayers, and traders. One of the most important was a petition presented to both Houses of Parliament by the Society of Arts. The question of Municipal Trading had been before that Society (see *ante*, p. 301); and the Attorney-General was in the chair on one occasion when a paper was read showing the dangers likely to arise to the ratepayers and the public from such trading. By way of illustration, he showed that an electric patent, for example, might be purchased by a municipality, and a large amount of money spent upon bringing it into use for the benefit of the ratepayers. Shortly afterwards, however, it might be found that another invention was better and of more public utility; and the result would be that the money expended on the prior invention would be rendered worthless. Thus the great evil of Municipal and State Trading would be to check private enterprise and the progress of invention, and at the same time to hinder national progress. The petitioners proposed that all Bills containing a manufacturing and selling clause should have their powers suspended until there had been a full inquiry into the whole question of Municipal Trading. He was glad to see that, as soon as the Chairman of Committees in their Lordships' House noticed these clauses in Bills, he struck them out—thus acting wisely, as he (Lord Wemyss) believed, in the public interest; and he understood that Mr. Lowther had followed the same course in the other House. There was no danger from these Bills this year. Still, the principle remained; and he asked that there should be a full inquiry on the subject, either by Royal Commission or by a Joint Committee of both Houses of Parliament.

The petitions included 27 from gas and water companies, and one from Messrs. W. Sugg and Co., Limited.

The following further progress has been made with Bills :—

Bills read a second time : Cambridge University and Town Gas Bill, Newhaven and Seaford Water Board Bill, Skipton Gas Bill, Herne Bay Water Bill, South Hants Water Bill, Stretford Gas Bill, Totland Water Bill, Walton-on-Thames and Weybridge Gas Bill.

Bills committed : Arbroath Corporation Gas Bill, Coalville Urban District Gas Bill, Fylde Water Board Bill.

Petitions have been presented against the following Bills : Airdrie and Coatbridge Water Bill, Bognor Urban District Water Bill, Bristol Gas Bill, Bury Corporation Bill, Bury Corporation Water Bill, Church Stretton Water Bill, Cobham Gas Bill, Dundee Gas, Tramways, and Extension Bill, Glasgow Corporation Gas and Water Bill, Glastonbury Water Bill, Great Yarmouth Water Bill, Hastings and St. Leonards Gas Bill, Lea Bridge District Gas Bill, Leigh-on-Sea Urban District Council Bill, Loughborough Corporation Bill, Loughborough Gas Bill, Lowestoft Water and Gas Company Bill, Mid-Kent Gas Bill, Nene Valley Water-Works Bill, Perth Water, Police, and Gas Bill, Rawtenstall Corporation Water Bill, St. Neots Water Bill, Salford Corporation Bill, Skipton Gas Bill, South Essex Water Bill, South Hants Water Bill, Stockton and Middlesbrough Water Bill, Wakefield Corporation Bill, Whitehaven Corporation Bill, Wishaw Water Bill, Wolverhampton Corporation Bill, Workington Corporation Water Bill, Yeadon and Guiseley Gas Bill.

HOUSE OF COMMONS.

Monday, Feb. 27.

ELECTRIC LIGHTING CLAUSES.

Mr. RITCHIE asked leave to introduce a Bill for incorporating in one Act certain provisions usually contained in Orders made under the Electric Lighting Acts, 1882 and 1888. He remarked that members who were familiar with Provisional Orders under these Acts were aware that incorporated in the Confirming Bill were 70 or 80 clauses almost identical in every one of the Orders made. This practice entailed great expense and delay in connection with the Orders, and it also created considerable liability to mistakes. The present Bill provided that, instead of setting out in every Order, as was now done, the various clauses alluded to, these might be incorporated, as was the practice now with regard to clauses of other Acts. They would not be stereotyped; but the Board of Trade would have the power to vary them if necessary in respect of any particular Order.

Leave was given to introduce the Bill; and this was subsequently done.

Thursday, March 2.

MUNICIPALITIES AND TRADING ENTERPRISES.

Mr. BARTLEY asked the First Lord of the Treasury whether he would consent to the appointment of a Select Committee of the House to consider the clauses appearing in many Private Bills this session authorizing Municipalities to enter into trading enterprises, and the resolutions of the various Chambers of Commerce on the subject.

Mr. BALFOUR, in reply, said the important question referred to was one deserving further investigation; and it was thought a proper method of investigation would be by a Joint Committee of the two Houses.

Sir J. LUBBOCK asked whether the Government would take steps to appoint the Committee at an early date, and whether the reference would be wide enough to include the whole subject.

Mr. BALFOUR replied that they would proceed at once to appoint the Committee, and no doubt the reference would be sufficiently wide to include all the subjects referred to in the question.

METROPOLITAN GAS COMPANIES.

Mr. COHEN moved on the 20th ult. for the appointment of a Select Committee "to inquire into the powers of charge conferred by Parliament on the Metropolitan Gas Companies, and to report as to the method in which those powers have been exercised, having regard to the differences of price charged by the various Companies."

Mr. PICKERSGILL moved, as an amendment, to add at the end of the motion, "and also whether the provisions of the Acts fixing the price of gas supplied and the rate of dividend should be reconsidered."

A debate arising, it was adjourned, under the twelve o'clock rule, till the following sitting, and eventually till to-day. On its resumption, the same rule came into force, and the matter again stood over.

Friday, March 3.

GENERAL POWER DISTRIBUTING COMPANY BILL.

On the motion for the second reading of this Bill (suspended from last session), the object of which was to erect a large generating station at Sookholme, in Nottinghamshire, and thence to supply electricity over an area of more than 2000 square miles,

Mr. STUART-WORTLEY moved the rejection of the Bill, on the ground that it was contrary to all parliamentary precedent governing matters of this kind, and because it was not necessary in the interest either of consumers or manufacturers. In no case had Parliament permitted a private undertaking to compete for the supply of electric light or power with a public authority already supplying the public. The Bill, if passed, would allow private adventurers to break up the streets and lay down mains against the will of the great Municipalities, which for years had been recognized by Parliament as the only authority fit to have exclusive control of all matters relating to public order within their areas. The passing of the measure would create a dual government in municipal affairs. It was attempted to introduce a most perilous innovation, prejudicial to the privileges of the great Municipalities. He contended that if such a startling change was to be made at all, it should only be by a general statute applicable in all cases alike.

Mr. PICKERSGILL seconded the motion.

Mr. BROMLEY-DAVENPORT, who supported the Bill, offered to exclude from its provisions the areas supplied by Municipalities.

Mr. STUART-WORTLEY expressed himself satisfied with this concession.

Mr. GALLOWAY moved the adjournment of the debate.

After some discussion,

Mr. RITCHIE urged that, after the undertaking which had been given, the Bill should be read a second time, so that it might be considered by a Select Committee.

The House divided on Mr. Galloway's amendment; the result being that the numbers for and against were equal—149.

Mr. GEDGE stated that he was in the "No" lobby, but that his vote had not been counted.

This having been verified, his name was added to the "Noes;" thereby making the number 150.

The SPEAKER next put the amendment for the rejection of the Bill; and it was carried by 164 to 132—a majority of 32.

The following further progress has been made with Bills :—

Bills read a second time and committed : Belfast Water Bill, Burley-in-Wharfedale Urban District Water Bill, Crowborough District Water Bill, Horsforth Urban District Council Bill, Ilford Gas Bill, Shotley Bridge and Consett District Gas Bill.

Bills reported : Crowborough District Gas Bill, St. David's Water and Gas Bill.

Bill withdrawn : Barking Town Improvement Bill.

Petitions against the Woking Water and Gas Bill have been presented by the Duke of Northumberland, the Earl of Lucan, and others.

Petitions in favour of the London Water (Finance and Purchase) Bills have been presented by the Vestries of Fulham, St. John, Hackney, and St. Pancras.

A number of additional petitions have been presented for an inquiry by a Select Committee into the subject of Municipal Trading.

The Metropolitan Water Companies Bill was a few days ago referred to the Standing Orders Committee, who have reported that the Standing Orders ought to be dispensed with, and the Bill permitted to proceed, on condition that the necessary notices of its objects are published forthwith. The Committee on the Bill are to report how far this order has been complied with.

The Electric Lighting (Clauses) Bill, referred to above, was issued on Friday, bearing the names of the President of the Board of Trade, the Attorney-General, and the Solicitor-General. The following explanatory Memorandum accompanies the Bill: "The Provisional Orders granted by the Board of Trade under the Electric Lighting Acts, with a few exceptions, follow the same model form; the modifications or additions required to meet special cases being rarely very numerous. The object of this Bill is to enable the provisions of the model forms to be incorporated in the Orders in the same way as the various 'Clauses' Acts, without reprinting those provisions in each case. For this purpose, the provisions of the model forms are placed in a schedule to the Bill, and the enacting part of the Bill incorporates them in any Electric Light Provisional Order, subject to the variations and exceptions contained in the Order itself. It will be possible in this manner to save the repeated printing of an immense amount of absolutely identical matter in each of the many Provisional Orders granted in each year by the Board of Trade under the Electric Lighting Acts."

LEGAL INTELLIGENCE.

HIGH COURT OF JUSTICE—QUEEN'S BENCH DIVISION.

Saturday, March 4.

(*Before Justices* GRANTHAM *and* KENNEDY.)

Broom v. Colchester Gas Company—A Question of Liability.

This was an appeal from a decision by Judge Paterson, at the Colchester County Court, on the 26th of October last, in a case in which Henry Broom, a labourer, sued the Colchester Gas Company, under the Employers' Liability Act, for damages in respect of an accident he sustained while unloading oil-barrels. (See "JOURNAL," Vol. LXXII., p. 978.)

Mr. C. E. JONES appeared for the plaintiff; Mr. E. WILD represented the defendants.

Mr. JONES, in stating the facts, said that at the conclusion of the case his Honour nonsuited the plaintiff on two grounds—(1) that there was no evidence to go to the Jury that the plant which was alleged to have been defective, and so caused the accident, was used in the business of the employer; and (2) that the evidence showed that the plaintiff was in the position of a contractor, and not in the service of the defendants. Broom was employed at piecework to unload a barge alongside the Gas Company's wharf; the Company finding, by arrangement with the captain, certain lifting gear which was supposed to be capable of raising a ton; but while lifting two casks which only weighed 7 cwt. the wire hawser snapped. Plaintiff was knocked down, and had both legs broken. Counsel contended that the case was one which ought to have been left to the Jury; there being abundance of evidence on both points.

Justice GRANTHAM, after the Judge's notes had been read, said he thought plaintiff was not in the position of a contractor.

Mr. WILD contended that there was no evidence that plaintiff was a workman in the employ of the Company. The test of a sub-contract was this: Does the chief contractor retain or assume direct and personal control over the workmen of the alleged sub-contractor?

Justice GRANTHAM asked who put up the lifting gear.

Mr. WILD said the captain of the barge. However, he did not rely upon the point that this was not machinery or plant used in connection with the business of the alleged employer, but based his case entirely on the contention that the plaintiff had not discharged the onus of proving that he was a workman. The evidence clearly showed that plaintiff was an independent contractor; he employed the men, and did the job in his own way and time for the sum of 1¼d. per cask. In *Moore v. Palmer*, Lord Bowen said the test in these cases was "who had the power of selecting, controlling, and dismissing;" and in *The Union Steamship Company v. Claridge*, Lord Watson said the test was "who had the control." Plaintiff had control of the job, and was in the position of a stevedore; consequently, no action would lie.

Their LORDSHIPS held that the County Court Judge was wrong in holding that there was no evidence to go to the Jury. What the effect of the evidence was would have to be decided by the tribunal before whom the case was tried.

The appeal was therefore allowed, with costs.

A Curious Water Supply Case.

In the High Court of Justice, Ireland, yesterday week, Mr. Justice Gibson, sitting without a jury, had before him an action by the Dublin Corporation against the Bray Town Commissioners in which the former sought to recover £500 for excess of water supplied by them to defendants. The case for defendants was that the amount claimed was not calculated in accordance with the statute; and they counterclaimed in respect of an injurious excess of water having been forced by the Corporation into the mains of the Commissioners. At the conclusion of the evidence, his Lordship gave judgment for the Corporation for the £511 claimed, and declared against the defendants on the counterclaim.

The Defalcations by the Gas-Works Clerk at Stafford.

At the Staffordshire Quarter Sessions last Thursday, before Sir Reginald Hardy, William Neighbour (23), clerk, was indicted for having omitted a certain material particular from a counterfoil receipt-book, with intent to defraud the Stafford Corporation, in whose employ he had been as Chief Clerk of the Gas Department. He was also indicted for having stolen three sums of £133 13s. 3d., £243 1s. 2d., and £289 0s. 5d. (see *ante*, pp. 85, 134). Mr. B. C. Brough appeared for the prosecutors; Mr. C. F. Vachell defended. The case for the prosecution was that the prisoner, whose duty it was to receive cheques and pay them into the bank, failed to make an entry in the counterfoil receipt-book respecting certain cheques; thereby enabling him to extract money from the cash-box. The defence was that prisoner was overworked with the multifarious duties of his office, and sometimes he had omitted to put down at the proper time the various entries he was required to make; but ultimately they had been made. He was found guilty, and sentenced to six months' imprisonment, with hard labour.

A Question as to Submitting Plans to a Local Authority.

At the Mark Cross Petty Sessions on Tuesday, the Magistrates were engaged for some time in hearing a case in which the Uckfield Rural District Council summoned the Crowborough Water Company for not depositing plans of a water-tower erected by them at Crowborough Beacon, and also for not giving notice in connection therewith, as required by the Council's bye-laws. Mr. Lampard represented the Council; Mr. Verrall defended. Mr. Lampard argued that while the Company had the right, under their Act, to put up a water-tower, the Council had jurisdiction over the way in which it should be erected, and that a Private Act of Parliament did not over-ride the general law. Mr. Verrall submitted that the law would not upset powers given by a Special Act, unless it was incorporated in that Act; and he contended that the defendants were entitled to do as they had done by virtue of their statutory powers. The question was argued at length by both parties, and eventually the Bench dismissed the summons; but, on the application of Mr. Lampard, they stated a case. Costs were refused.

MISCELLANEOUS NEWS.

THE HOME OFFICE WATER GAS INQUIRY.

Before proceeding with our abridgment of the official report of the evidence submitted to the Departmental Committee on water gas, we would direct attention to matter bearing upon the subject which appears in other parts of this issue of the "JOURNAL." The criticism of Mr. A. E. Broadberry, of Tottenham, on the figures in Table I in the first appendix to the Committee's report has drawn from Dr. Haldane a reply, which we have pleasure in publishing in our "Correspondence" columns. Elsewhere it will also be found that the Liverpool Corporation have resolved to call upon the Members of Parliament for the city to urge the Government to pass a Bill to give effect to the recommendations of the Committee; and a paragraph records that the Gas Committee of the Birkenhead Corporation consider that the report fully exonerates and justifies them in the course they have pursued in regard to the supply of water gas.

Continuation of the Summary of the Evidence.

At the fifth day's sitting of the Committee on May 11, two medical witnesses were examined; the first being

Sir HENRY D. LITTLEJOHN, *the Medical Officer of Health for Edinburgh.* Witness commenced with an admission that he had had no experience of poisoning by water gas; but, he said, the people of Edinburgh had taken alarm at the very notion of its introduction. The gas supply was managed by a popularly elected Commission, who were anxious to introduce water gas for the purpose of supplying the needs of a large population, and also to lower their charges. He had perfect confidence in the Commission, who, whenever there was any profit made, returned it to the ratepayers by lowering the price of gas. He had made a report on the subject of water gas to the Town Council, which was accompanied by analyses of the gas supply by the City Analyst (Mr. J. Falconer King).* Since those analyses were made, he (witness) had made another examination of the gas, and found that the percentage of carbon monoxide had increased to 14·1. The question was who was to settle the exact percentage of this gas, and who was to be at the expense of watching the fittings of the inhabitants? Throughout Edinburgh, the fittings were somewhat defective—in fact, half of the complaints there as to the escape of sewer gas were really due to minute quantities of escaped lighting gas. The Health Committee were anxious to determine whether the Gas Commissioners should undertake the duty once for all of examining the gas appliances in the city, and then call on the Corporation to look after them, or whether they should call upon the inhabitants to put their gas appliances right. He supposed that a gasfitter would charge 2s. 6d. per household to overhaul the gas appliances; but perhaps it would be hard to call upon the poor to pay this fee of 2s. 6d. or 5s., in order to secure themselves against possible poisoning. The point was who was to take the initiative. It was pointed out to witness that it would be easy for the Gas Commissioners to undertake the duty; seeing that they could say: "The gas will have to cost a little more; but we think it worth while to inspect the appliances." As the responsible Medical Officer, witness agreed with this view. He thought the Gas Commissioners should do the work in the first instance, and then throw the onus on the inhabitants and Corporation. The cost would be little after the initial expense. "If," remarked Lord Belper, "water gas, being avowedly more noxious, can be produced at a lower cost than other gas, the amount of money which is thus saved may fairly go towards securing greater immunity from noxious effects." "That," observed witness, "is the crux of the question. I am glad to hear you say that. This coming from the Committee would have a great effect." With precautions, witness considered that 14 per cent. of carbon monoxide in the supply would not be too much. He also mentioned that he had been approached by employers of labour, who feared that actions for damages might be brought against them by their workpeople for ill-health caused by an escape of carbonic oxide. It was his opinion that, if it were left to householders to put their fittings in order, it would be neglected, owing to the shiftiness of the population; and his experience was that the poorer classes did not pay attention to gas escapes. Gas matters were managed much better in Edinburgh than in Glasgow, especially in connection with the mains, which were well laid. They had not had the fearful cases of poisoning that had occurred in Glasgow. Witness assented to a suggestion of Lord Belper that in other places, where gas companies' shareholders were making a profit out of the gas undertaking, it was really to their interests that there should be escapes in houses, because all the escaping gas had to pass through the meter. Regarding the point in the evidence of a previous witness that, living in a room where there was a very small escape of gas might produce chronic poisoning, witness held that in such cases children especially would suffer. The symptoms produced by a slight smell of gas were just like those which commenced with typhoid. In confirmation of his contention, he said that, when Lord Playfair was Professor at Edinburgh University, he was greatly annoyed by a slight smell. His daughter was apparently made ill by it; and the smell was traced at last to an escape from a burner not well fitted into its socket. Burners, in witness's opinion, rarely fitted well; and this was one of the risks he most dreaded. His attention had not been called to a paper by Professor Corfield in which he spoke of sore throats being caused by gas; but he could understand it—it was most insidious. He should certainly say there was reason for attributing these symptoms to the carbonic oxide in the gas. Sewer gas produced the same symptoms; but not to the same extent. He did not think it devitalized the blood to the same degree as carbonic oxide. In the case of typhoid fever, they had a distinct bacillus, which they had not with carbonic oxide. The symptoms he had been referring to—malaise and sore throats—were hardly perhaps those of carbonic oxide poisoning. The symptoms were generally nervous ones—such as

* The report was handed in; and it forms part of Appendix VI. It was published in the "JOURNAL," Vol. LXX., p. 958. Mr. J. Falconer King's analyses were made on July 6, 9, 13, and 15, 1897; and they showed that the carbon monoxide in the upply ranged from 9 to 9·9 per cent.

dizziness and great muscular debility. Still it was difficult to predicate when a gas like this fundamentally attacked the blood. He attributed the few escapes from the gas-mains in Edinburgh to the great depth at which they were laid, and to the care taken in making the connections. The mains were certainly laid from 4 to 6 feet deep. His suggestion was that greater attention should be given to house fittings; but he confessed that this would not prevent the majority of cases of fatal poisoning, which were accidental. The introduction of water gas in Edinburgh did not result in any saving in price; and moreover the lighting quality of the gas was universally complained of. It had been gradually deteriorating during the last four years. The Gas Commissioners were removing their works to Granton, in order to meet the difficulty of extension on the present site, and to cheapen the cost of production. He understood they were going to transfer their water-gas plant to Granton, and make as much of the gas as possible up to a certain amount—a proportion of 17 per cent. of water gas in the total supply. It was pointed out by the Chairman that they had further evidence that there was no difficulty in obtaining a greater illuminating power from water gas, upon which witness remarked that he must say Edinburgh gas was deficient in luminosity.

The next witness called was

Dr. E. W. Hope, *the Medical Officer of Liverpool.*

The question of the supply of water gas had also appealed to this witness almost exclusively from the point of view of how it might affect the public health. Liverpool had just then had an unfortunate experience with gas, which had resulted in the poisoning of several people, one of whom—a Swede—was fatally poisoned. It appeared to witness to be most desirable that some warning should be given, in order that the fittings might be adapted to the special kind of gas in use, and that the public might take steps to protect themselves. From his experience, it seemed that a special sort of fitting should be used, such as would prevent leakage. Attention, he thought, should also be specially paid to incandescent burners having a bye-pass, which from time to time might be blown out; and thus allow a leakage, which, in the case of water gas, would be more dangerous than with ordinary coal gas. He was decidedly of opinion that leakage from a bye-pass of gas containing a considerable percentage of carbon monoxide would affect health. Then with regard to the ordinary burners, it appeared from an investigation which had been made that the fittings supplied for coal gas were not well adapted for carburetted water gas. Photographs which he had with him showed that the burners became more or less choked—with carbon, he presumed—so that the illuminating power was lessened. He did not altogether question the advantages of using water gas; and, given proper fittings, he had no desire to question it. At one of their large hospitals, they had a constant complaint about the illuminating power of the gas; and it transpired that it was due to the burners being choked. They had been having an average of 52 per cent. of carburetted water gas in the supply; and, of course, the greater the amount of carbon monoxide in the gas, the greater the damage in the event of an escape. In the case of the poisoning of the Swedish emigrant, it was assumed, the burner not having been turned off, that the light was blown out. Three companions, who were in bed in the same room, were found insensible. They were promptly taken into the open air and ultimately recovered; but the symptoms in their case, as described by the medical man who attended them, pointed to carbonic oxide poisoning. Witness was present at the inquest on the one who died; and the body presented all the typical appearances of carbonic oxide poisoning. Instead of the usual leaden appearance, it was bright and fresh looking; and the ears and nostrils were pinkish. It was admitted that water gas had been supplied up to 11 o'clock that night; and it was stated at the inquest that orders had been given to shut off the supply of water gas at that hour. There was, however, no evidence to show that this order had been obeyed; but anyway the pipes might still contain a good deal of water gas some time afterwards. At that time the amount of carbonic oxide varied in the gas at different hours of the day; but the supply contained about 30 per cent. of carburetted water gas. The percentage of carbonic oxide was 14·1; but there had been larger quantities in the immediate neighbourhood. The maximum supply of carburetted water gas being 52 per cent., that would be equal to a total of 19·4 per cent. of carbonic oxide in the mixture. As a matter of common sense, one would say that, assuming there was danger with 6 per cent. of poisonous gas, the danger must necessarily be greater with a gas containing over 30 per cent. of the same poisonous gas. The first complaint in respect to the supply of water gas in Liverpool arose from a trifling cause—that was its effect upon the burners; and then people alleged that they had feelings of malaise and so forth if they burned this gas in their stoves. But he did not think the latter was likely unless there were escapes. The supply of water gas in Liverpool varied considerably; and it was from those parts to which the most water gas was supplied that the complaints as to the blocking of the burners came. For external street lighting, he thought there could be very little risk in the supply of water gas; and he understood that, although the consumers had not benefited, the process was much cheaper, owing to the immense saving of labour. Asked as to the percentage of carbonic oxide that should be allowed, he replied that this was a very difficult question; seeing that, on the face of it, the less carbonic oxide the better. The amount of carbonic oxide in ordinary coal gas was about 6 per cent.—5·6 to 6·3—and any augmentation increased the danger. If an increase to 7 or 8 per cent. had any advantages to compensate it, and care was exercised to see that the fittings were in order, he thought that this percentage would not materially increase the danger. Personally, he would limit the supply of dangerous gas to the narrowest confines. He admitted that his proposal would not allow 20 per cent. of carburetted water gas in Liverpool; but he added that, of course the question turned very largely on the amount of care which could be ensured in regard to the fittings. It appeared to him that the water-gas industry was comparatively new; and until more evidence was obtained as to the possible maximum which might be allowed, he certainly thought it should be the duty either of those supplying the gas, or of those responsible for the public health, to be also responsible for the fittings. Properly, he thought, the obligation should be upon the gas companies, though they might object at first. If the house fittings were perfect, the risk of acute poisoning would be appreciably diminished. In regard to the Boston report for 1897, a number of the cases of poisoning were due simply to leaving the gas turned on; but no doubt some of the cases were due to defects. "Very few," remarked Dr. Haldane; "and my difficulty is to see how inspecting the fittings would diminish the risk appreciably in view of these statistics." Witness (continuing) said that one of the Garston poisoning cases was due to a loose tap, which was a defective fitting. In the Artizan's Dwellings at Liverpool, they had discontinued the supply of gas by the slot system, thinking it would be attended with dangerous results. The danger would be greatest in the poorer parts of the city, inasmuch as the people were less careful in their habits, and the cubical space of the rooms of the houses was less. They had a large number of Scandinavians come to Liverpool who were not familiar with gas. Dr. Parsons suggested that in such cases it would be an advantage to put up a caution. Witness accepted the suggestion as a valuable one, and said he would have it done. As to the inspection of the fittings, he took it that, on leakages being discovered, it would fall upon the Sanitary Authority to enforce the repairs. There certainly seemed to be strong reason for the Sanitary Authority being charged with the appointment of the officer necessary to discover the existence of leakages, just as inspectors of nuisances were appointed; but it did not seem fair that the cost of this officer's salary should fall upon the Sanitary Authority, seeing that the need for the appointment was brought about by the Gas Company. Lord Belper was anxious to know how this would work when the Local Authority were the gas suppliers; but witness was of opinion that they might be trusted. He thought that, as a rule, Corporations discharged all their obligations.

At the sixth sitting on May 17, the evidence from Liverpool was continued by

Mr. William King, *the Engineer of the Liverpool Gas Company.*

Witness commenced with the interesting information that he had held his position for 31 years, and succeeded his father, who occupied it for 42 years. The gas supplied by his Company was, he believed, the highest in illuminating power in England, Wales, and Ireland. It was bound by Act of Parliament to have an illuminating power of not less than 20 candles, tested 1000 yards from the works. Before any illuminating power was fixed by Parliament, the Company supplied gas made from cannel coal; and a high quality gas had always been given. At a later period, the Corporation wished the illuminating quality maintained; and, the Company being willing, 20-candle power was fixed. The burner used for testing was Sugg's No. 7 batswing; but the method of testing was similar to that practised in London. The cost of cannel had risen very considerably; and to keep up the same illuminating power, they had had to increase the price of gas. For this reason, his attention was directed to carburetted water gas—more particularly as he was about to erect new works. An investigation of the process in America so satisfied him that, on his return, he advised his Directors to construct the new works on the carburetted water-gas principle. There were many advantages about the gas. It could be made cheaper, with less labour, and quicker; and he had another important consideration in view in recommending it—that, if the Company had two modes of manufacture, and were not entirely in the hands of the cannel people, they would be able to buy cheaper. He thought they had produced this desirable result. He also made considerable inquiries about the increased danger in cases of escape, and matters of that sort; but he had no information which influenced him adversely. As the result of his report, carburetted water-gas works were erected at Garston; and plant was being constructed at one of the other works. The additional works were required to produce a better gas at a cheaper rate; but principally to meet the increased demand. For the reasons given, he thought that it was very desirable that Liverpool should have carburetted water-gas plant. Another advantage was the small amount of space occupied; they could not have made such an extensive addition to their supply with coal-gas plant. Then carburetted water gas contained hardly a trace of sulphur compounds; whereas their presence in coal gas was certainly objectionable. In some parts of Liverpool, the carburetted water gas was supplied unmixed with coal gas; and there some trouble was experienced with the burners. Owing to the high quality of the gas, the burners were smaller than in other towns; and owing to the greater specific gravity of the carburetted water gas, it was found necessary to change the burners, or if people did not do so the flames were small. There was also some trouble with the formation of carbon in the burners; as, in consequence of the greater weight of the gas, it did not flow so rapidly through the burners. He did not find the same effects where a small percentage of the gas was used. The carburetted water gas was (at the date of the evidence) being delivered from the Garston works mixed with the same bulk of coal gas—50 per cent. of each; and this would contain from 18½ to 19 per cent. of carbon monoxide. He had ascertained this by frequent analyses. Practically, he thought that the mixture he had mentioned could be used as safely as coal gas, and that it was a better gas for all purposes. If there was an escape, it was as easily perceived as if coal gas alone were used; and if the escape took place when people were asleep, so far as his own experience went, he had no reason to think there would be any appreciably greater danger. Witness was interrogated at some length on this point, but he adhered to what he had already said, that the practical distribution of carburetted water gas could be carried on as well as coal gas. The escape of coal gas might produce very deleterious results. He thought it probable that, in the cases of poisoning in Liverpool, the same effects would have followed if ordinary coal gas, under the circumstances, had been distributed. He believed other people had taken a different view. In the case of the poisoning of the Swedish emigrant, so far as the evidence showed, the supply to the district in which it occurred had, during the earlier part of the night, been a mixed gas, because the works supplying that portion of the district were not large enough to supply it without assistance. At a later period, the smaller works were sufficient to supply the district, and those were coal-gas works only. They had evidence to show that the water gas was shut off at 11 p.m. It would, however, be very difficult to determine how long it would take to consume the gas remaining in the pipes; but he thought it would be consumed in something less than three hours. Lord Belper asked witness whether he agreed with the statement made at the inquest by Mr. C. R. Bellamy, the Corporation Lighting Superintendent, that as much carbonic oxide would pass through the burner in two hours with water gas as in six hours with coal gas; and consequently water gas was far more dangerous. Witness replied that if they took carbonic

oxide only and breathed it, they were informed that that was a dangerous poison; and as an entirely abstract question, the gas containing most carbonic oxide would be the most dangerous if inhaled. The medical evidence was that death resulted from carbonic oxide, and that was the verdict. Questioned as to what precautions the Company took to ascertain whether carburetted water gas could be distributed as safely as coal gas, witness said the fact that a considerable quantity was made in London at that time, and also the enormous quantities used in America, seemed to him, from the information that he was enabled to get, to be all that was necessary on that point in making a favourable report to the Directors. He did not make any special inquiry into the statistics of poisoning in America. But the system was being rapidly extended; and it seemed improbable that it would be so largely adopted—to the extent in some places of entirely superseding coal gas—unless it was a satisfactory one. He then had faith in carburetted water gas, and still had. The only object the Directors of the Liverpool Gas Company had in view was to supply the best possible gas to the public at the lowest possible price, keeping up the quality, and fulfilling in all particulars the obligations placed upon them by Act of Parliament. Therefore, in adopting the new process, they were guided solely by that desire. Lord Belper remarked that this was a candid statement if witness meant by it that it was unnecessary to inquire into the question of danger. Witness answered that the element of danger seemed to be so infinitesimal that it did not come into the practical question. He was aware that there had been agitation in America on the subject; but it had died down. Information was next requested by the Committee as to how the two gases were mixed. The coal gas, witness said, was carried in a main from the coal-gas works to Garston, where there was one large holder. There were two large meters placed side by side at the works; and the gas was measured in these—the coal gas in one and the carburetted water gas in the other. The indices were hourly observed; and a record was kept of the quantity passed through each, so that the proportion was regulated with the greatest nicety. If the slightest variation took place, the valve was either opened or closed, so that the proportion was exactly observed; and the gas was carried into the holder properly mixed. The population of the whole district supplied with carburetted water gas, pure and mixed, he thought would be from 180,000 to 200,000. From March 8, 1895, to Jan. 27, 1897, carburetted water gas was supplied to the Garston district without any mixture of coal gas. According to the consumption, the distance would vary at which the carburetted water gas extended before mixing with coal gas; and between the dates named Garston, Allerton, and Aigburth probably always obtained pure water gas. The population in that area would perhaps be 40,000. There could be no definite limit in the area supplied owing to the constitution of the mains. The cases of poisoning to which he had referred occurred during the period that pure carburetted water gas was supplied in Garston; and there was also the case of a sea captain at the Garston Hotel. He had no knowledge of any other cases. He was not aware of any being reported before the use of carburetted water gas; nor of any since pure carburetted water gas was discontinued, excepting one in Liverpool. Taking a room of limited capacity into which gas containing a large percentage of carbon monoxide was escaping, he presumed poisonous proportions would be reached sooner than with a gas having a smaller percentage. Asked whether raising the pressure of the gas would not have the effect of increasing the flow from burners, he said that in their case they increased the pressure somewhat, in order to compensate for the greater specific gravity; but this made the flame burn under a higher pressure. This was undesirable; there being a point at which increased pressure did not produce the desired effect. Many consumers would not use larger burners; and it was to meet the general difficulty that they resolved to mix the carburetted water gas with the coal gas. This was the only reason which led to the mixing. With his experience, he should certainly prefer to use carburetted water gas to cannel gas. Would it not (witness was asked) be possible, from a gasmaker's point of view, to avoid a large quantity of carbonic oxide by introducing a comparatively small quantity of carburetted water gas of a very high illuminating power? That, he replied, would defeat the very object they had in view, which was to make carburetted water gas in bulk. It was made much more cheaply than their coal gas. A further inquiry was whether, under all circumstances, witness would not undertake to produce a very cheap, but poor illuminating coal gas; and the answer was that a large extension of the coal-gas plant would be required, at considerable cost. He thought at the present time they obtained from the coal all the gas they could. Witness's attention was called to a report of a meeting of the Garston District Council, at which it was stated that Messrs. Davis and Son, of Liverpool, had found that two samples of gas taken in Garston on April 5 contained respectively 23·6 per cent. and 23·2 per cent. of carbon monoxide, from which it was argued that about 75 per cent. of the gas supplied must have been water gas, though it was alleged that the Company had undertaken not to mix a greater quantity than 25 per cent.* Witness's reply was that he was prepared to show, by the Company's books, and by accurate means, that the composition of the gas for months previously, and up to that day (May 17) was half and half; and taking the carbon monoxide in the coal gas as being 6 per cent. and in the water gas 30 per cent., this would give in the mixture 18 per cent. He at once had an analysis made of the gas, when the report in question appeared in the Press; and for that day it showed 18·6 per cent. of carbon monoxide. Of numerous analyses made both previously and subsequently, the highest results were from 18 to 19·2 per cent. No guarantee had ever been given of any particular percentage. They found that 50 per cent. of water gas gave a beautiful gas. On the completion of the water-gas plant at the Linacre works, nearly the whole of Liverpool would be supplied with a mixture of carburetted water gas and coal gas.† If legislation were passed, limiting the carbon monoxide to 15 or 16 per cent., he thought it might jeopardize their supply.

Sir HENRY ROSCOE, *F.R.S.*,

followed. He said he had visited most of the water-gas plants in this country; and many on the Continent. He had also reported on the subject to the Birkenhead Corporation.‡ There was no doubt that water gas containing 39 per cent. by volume of carbon monoxide had been used with safety—that was to say, without calling any very considerable attention to accidents that had occurred—both for heating purposes and as an illuminant. But in England the pure gas had only been used to a slight extent; whereas in America it had been employed in the pure form, as a non-luminous gas, with incandescent burners to a large extent. Uncarburetted water gas was at one time used largely in America; but wherever water gas was employed, some means should be taken of making it sensible to the smell. It was an easy matter to odorize the gas. It could be done by the use of a strongly smelling substance, such as mercaptan. In an application from Llandrindod to the Board of Trade in 1890 for power to make water gas, the Board allowed its use, provided it was odorized by such a body capable of giving it a pungent odour as might be approved of by the Board.* Of course, it might be expensive to odorize the gas for steel smelting, and purposes of that kind. Carburetted water gas contained about 29 per cent. of carbonic oxide; and the coal and cannel gas at Birkenhead, from 5 to 6 per cent. The Birkenhead gas as supplied to the town contained from 10 to 12 per cent. of carbonic oxide; and he had calculated that 26 to 27 per cent. of the supply was carburetted water gas. On the question of how far the effect of various quantities of carbonic oxide was detrimental to the health of human beings, there was considerable difference of opinion; and (alluding to the American reports) it was extremely difficult to place great weight on statistics relating to the number of deaths from inhaling illuminating gas, while discriminating between those which were attributable to the action of water gas on the one hand and coal gas on the other, or between accidents and cases where death had been caused by suicide or drunkenness. He found that in the five years ending 1883 (according to a statement in the "JOURNAL OF GAS LIGHTING" for Jan. 26, 1886) 24 deaths from inhalations of gas took place in England and Wales, of which 17 could be definitely traced to coal gas; and this was before the introduction of water gas. Therefore they should consider whether the deaths now attributed to water gas would have been produced by coal gas alone. He agreed that carbonic oxide in these gases was a dangerous element; but in considering the question of the increase of danger, or the chance of death, in the event of an escape, they must investigate the nature of the escape. For instance, if, as occurred at Preston, the tap in a room was allowed to remain full on, whether it was coal gas, carburetted water gas, or a mixture of the two, the effect would be identical. The time within which death might take place would depend upon the amount of carbonic oxide in the gas; and it was possible that there might be cases in which people would recover if the gas only contained a small quantity. But in cases either of gross negligence or ignorance, the result would be the same with coal gas as with coal gas mixed with water gas. As to whether a restriction should be put on the amount of carbonic oxide in the gas, he said they could not legislate against accidents arising from ignorance or drunkenness; but if it could be shown that deaths had occurred in considerable numbers where carburetted water gas had been introduced, and were due to real accident, then the supply ought to be prohibited altogether. But he had been unable to obtain evidence of this sort. When he said "prohibited," he meant that the quantity of carbonic oxide being brought up to a large amount should be prohibited. In ordinary households where the usual precautions were taken, where the gas-fittings were of the usual character, and where coal gas was mixed with carburetted water gas, he had no knowledge of any death having occurred, except in cases where the gas was allowed to escape full on. Allowing for certain leakages in fittings which were never really tight, he had no knowledge of death having occurred where water gas was mixed with coal gas in England, excluding all cases of taps being turned. He was inclined to agree that a limit of carbonic oxide should be fixed; and that it should be about 17½ per cent., which would give something like equal volumes of the gases. He did not think the use of water gas was so much a matter of economy as one of rapid production. Giving his experiences of water gas on the Continent, he mentioned that at Gelnhausen, he saw eighty men sitting at a table, making electric lamps, with blow-pipes in front of them fed by pure water gas; and there had been no accident there. Reverting to the statistics he had quoted from the "JOURNAL," witness said figures of this kind were very doubtful evidence; but at the same time he believed the number of deaths from gas of any kind was very much less than the number from the upsetting of petroleum lamps. Taking, said Lord Belper, the cases of death from coal gas, so far as it was possible to get statistics, it was clear that the number was small; and witness was of opinion that the number from carburetted water gas had also been very small. In this matter, he observed, they must look at practical results; and the question was whether many deaths had occurred in England since the introduction of carburetted water gas. In the absence of such evidence, to entirely prohibit the use of carburetted water gas was uncalled for; but in order to meet a supposed or real danger, it might be possible to restrict it down to equal volumes. Asked whether he knew of any toxicologist who had testified to the non-dangerous character of carburetted water gas, witness handed in a paper giving the opinions of several scientific men.†

* See "JOURNAL," Vol. LXXI., p. 1079.

† As recently reported in the "JOURNAL," the Linacre plant has since been completed, and brought into operation.

‡ See "JOURNAL," Vol. LXXI., p. 1080.

* Clause 18 of the Order provided: "All gas supplied by the undertakers shall, if not sufficiently odorized by the materials employed in the manufacture thereof to render any leakage or escape of the gas easily detected, be passed through a locked chamber or reservoir containing mercaptan, sulphurized acetone, or such other pungent odorant as may be approved by the Board of Trade in writing, not accessible to those engaged in the manufacture, so that the gas may be impregnated or mixed with a sufficient quantity of such odorant before reaching the gasholder, and that the gas supplied therefrom may be readily detected in the event of any leakage or escape from the mains or pipes, either outside or inside the premises supplied." Clause 22 gave power to the Board of Trade, upon the application of the Sanitary Authorities, to appoint inspectors for the purpose of seeing that no leakage from the mains or pipes takes place, and that the gas is properly odorized. The powers in this case were not exercised; and they therefore lapsed pursuant to section 11 of the Gas and Water Facilities Act, 1870.

† The paper handed in by Sir Henry Roscoe appeared in Appendix VI., and contained the following, among other opinions—Dr. E. Frankland: "I have no hesitation in saying that water gas may be used with safety both in public buildings and in private houses. I should be delighted to substitute this pure and powerful illuminating agent for the gas with which my house in London is at present supplied, although it is used in all the bedrooms." Dr. Adolphe Wurtz, of Paris (Professor of the School of Medicine

Following Sir Henry Roscoe came his Assistant,

Mr. FRANK SCUDDER, F.I.C., F.C.S.,

who had made investigations in America at the request of Sir Henry. He first gave information as to towns in America where uncarburetted water gas was in use—where the gas had a non-luminous flame. At a place called Hyde Park, there were 3000 houses lighted with uncarburetted water gas. The population was 120,000; and the area, 4½ miles. There was also incandescent electric lighting and incandescent coal-gas lighting side by side with this system—in fact, there was free trade in lighting there. The uncarburetted water gas (which contained 39 per cent. of carbonic oxide) had been in use eighteen months at the time of his visit in September, 1895. The next place where he found uncarburetted water gas was Jackson City, where more than 8000 burners were used; and the testimony of the consumers was unanimously in favour of it. The gas was employed both for domestic purposes, and in the streets. There were no regulations in regard to its use; but, though there was no compulsion to do so, they tried to odorize it with petroleum. Regarding carburetted water gas, he visited most of the gas-works in New York and Chicago; and he came to the conclusion that the cost of making it there was quite as much as the cost of producing coal gas in England. But they aimed at competing with the electric light. To do so they jumped from 20 to 24, 26, and even as high as 30 candle power gas. In New York the gas supplied contained 29 per cent. of carbonic oxide, in addition to the high illuminants referred to. His general experience was against imitating this method of manufacture. They carburetted and fixed the gas in separate vessels from the generator; and in New York they used as much as 5 gallons of oil per 1000 cubic feet. The gas manufactured in the States was much more liable to condensation, owing to the large quantity of oil it contained, than coal gas as manufactured in England. He inquired also into the question of safety, and agreed generally with the conclusions stated by Sir H. Roscoe. The essential difference between England and America was that in America anthracite coal was much more abundant, in proportion, than bituminous coal; and that was why the water-gas industry had made such rapid strides in that country. Anthracite coal yielded very large quantities of gas—as much as 37,000 cubic feet from a ton. With regard to crude gas, that had a distinct odour, as it contained, and smelt of, sulphuretted hydrogen. It was the removal of the sulphuretted hydrogen that killed the two men some time since at the Leeds Forge. He made a great many experiments on the action of the gas there; and it was proved conclusively that there was an escape of gas from which the sulphuretted hydrogen had been removed by purification—sufficient to cause the insensibility which overtook the doctors who conducted the *post-mortem* examination. The gas had been odorized ever since. The carburetted water gas at Birkenhead was much more pungent than the ordinary coal gas.

The evidence from Liverpool was supplemented by

Mr. C. R. BELLAMY, the *Superintendent of Street Lighting to the Liverpool Corporation.*

He stated that, with the extension of the Liverpool United Gas Company's water-gas plant, the manufacturing capacity would be equal to two-fifths of the maximum day's demand. The Corporation Lighting Committee did not actively oppose the introduction of water gas, because the Company were acting within their statutory powers; and it was strongly represented that considerable economies in manufacture would ensue. It was introduced at a time when there was a feeling in Liverpool that gas production ought to be cheapened; and the general opinion of the Committee was that the increased risk, carefully considered, attending the use of a small addition of water gas (the plant at first proposed representing less than one-fifth of the total works capacity) would be balanced, in the general view of the consumer, by the cheaper supply. Instead, however, of the Company using it in combination with, and for the enriching of, their coal gas, it was adopted merely as a supplementary supply, and was delivered to Garston and the south end of the city unmixed with coal gas. The new gas being denser than that produced from coal, burners of greater aperture were required for its combustion. With the burners generally in use, there was a decreased consumption at a higher pressure, resulting in a lowering of illuminating power, accentuated in time by a carbonaceous deposit in the aperture of the burners. There was no doubt that, under their Acts, the Company had the right to manufacture water gas or anything else, as it was specially stated that they might manufacture gas from coal, oil, or other material. But the Lighting Committee felt that the powers obtained by the Company in 1886 to raise £400,000 of additional capital (£180,000 of which was still unissued) ought not to have been applied to the laying down of water-gas plant without consulting the Corporation. As to the danger of carburetted water gas, the fittings in common use were not capable of being used with safety if there was a large percentage of carbonic oxide in the gas. He had tested the fittings in a number of houses, and in no single instance had he found them sound at the ordinary working pressure. The greatest leakage he discovered was 2½ cubic feet per hour; and the least was 0·0204 foot per hour. This might not be sufficient leakage to kill anyone; but it would be highly detrimental to health. All water fittings, valves, taps, and cisterns, had to be stamped by the Corporation; and they thought the same thing was necessary with gas-fittings, if water gas was to be used. It was found that the leakages were largely at the fittings—at the swivel joints and taps. His suggestion would not meet cases of gas being turned off and on again; and, in connection with this, they felt very strongly there should be a limit to the carbon monoxide allowed. Their suggestion was that it should not exceed 12 per cent., which would allow the Company to send out 25 per cent. of carburetted water gas. This gas had (then) been supplied to the city for eighteen months; and it might be fairly asked to what extent, if any, its introduction had cheapened the gas supply. The selling price of gas for the past ten years, and the cost of coal, &c., respectively, had been as follows:—

Year.	Price of Coal and Enricher. Per Ton.	Price of Gas per 1000 Cubic Feet.
	s.	s. d.
1887	15·22	2 8
1888	14·61	2 8
1889	14·42	2 8
1890	15 05	2 8
1891	17·17	2 8
1892	16·5	3 0
1893	18·58	3 0
1894	20·58	3 0 & 3 4
1895	16·5	3 0
1896	15·08	3 0 & 2 10

Between 1886 and 1891, gas was sold at 2s. 8d. per 1000 cubic feet, and subsequently rose to 3s. and 3s. 4d., owing to the coal advances. But although the price of coal in 1896 was as low as in the normal years 1887-90, the price of gas had not descended to the level of those years. It might be urged in explanation that the conditions relative to residuals and labour had varied in the meantime; but if the statistics of the country were taken, it would be found that there had been a general return to the selling price preceding the coal trouble in 1889-90. Of the 387 authorized gas companies included in the parliamentary return for 1896, 54 per cent. were selling gas below the price of 1890, 38 per cent. at a price equal to that of 1890, and only 8 per cent. were charging in excess. Under these circumstances, there did not appear any good reason why the price in Liverpool should be higher than in the normal period referred to, especially in view of the fact that water-gas plant, representing one-fifth of the total output, had been adopted on economic grounds. It was also noteworthy that, according to the 1896 returns, in every case in which a gas company was selling gas at 2s. and under, coal gas alone was supplied; and further that the two principal gas undertakings in the country which had adopted water gas on a large scale—viz., The Gaslight and Coke Company and the Liverpool Company, were charging a higher price for the mixed gas than they formerly did for coal gas. In 1887 the latter Company were paying for coal and cannel 15·22s. per ton, and in 1896 15·08s. He thought the evidence pointed to the fact that it cost more to make carburetted water gas in Liverpool than coal gas. He did not think the arguments of Mr. William King as to the economy and necessity of water gas could be substantiated. There was no use for the existing water-gas plant except for a few days in the year, unless the Company threw out of use a large amount of coal-gas plant; and yet arrangements were being made for further water-gas plant representing an addition of 22 per cent. [This refers to the Linacre plant, since completed.] It was pointed out that one of the reasons given by Mr. King for adopting the plant was the reduction in the cost compared with coal gas, then, said witness, he should give some explanation as to why he was charging a higher price for the gas. It might be taken from him that the increased consumption of gas had not exceeded 1 per cent. over an average of five years. Unless the Company had swept away a great deal of their coal-gas plant, it was practically capable of supplying the needs of Liverpool. In 1892, this plant was equal to the supply of 18,893,000 cubic feet per 24 hours; and in 1896-7, the maximum day's output was 18,520,000 cubic feet. In order to lower the percentage of carbon monoxide, all the Company would have to do would be to increase the quantity of ordinary gas they were producing, and distribute the mixture evenly throughout their district. At Widnes, which was close to Liverpool, gas was being put into the holders at 7½d. per 1000 cubic feet, and supplied at 1s. 6d. What he failed to understand was why, if gas could be made at Widnes from coal at 7½d., water gas should be made at Liverpool when it could not be shown that it could be produced for anything like that price; the cost at Liverpool, on the same basis as the Widnes cost, being 1s. 8½d. The illuminating power of the gas at Widnes was 18 candles, with the "G" burner, or 17 candles with the Liverpool burner. The Liverpool Company had to supply gas of a higher illuminating power; but he contended that it should not make a difference of more than 1d. per candle. Yet at Widnes the price of gas was 1s. 6d.; and at Liverpool 2s. 9d. In the event of the carbon monoxide being limited, and this causing any difficulty to the Company, the Corporation would very readily consider whether it would be necessary to reduce the statutory candle power. But in the old days each candle of enrichment cost 2d. per 1000 cubic feet; and now that it was assessed at ½d., they thought there was good reason to keep the illuminating power where it was. The dividends paid by the Company were 10, 7, and 4 per cent. on the various stocks. The works in Widnes belonged to the Corporation; and no doubt the dividend paid by the Liverpool Company very largely affected the price. The difference in the cost of making the gas in Liverpool and Widnes ought only to be 3d.; and Mr. King practically supplied this figure when he said that each additional candle power cost 1d. per 1000 cubic feet. Finally, witness put forward the following five suggestions: (1) That there should be a maximum limit upon the carbonic oxide in the gas of 12 per cent., which would mean 25 per cent. of carburetted water gas, and 75 per cent. of coal gas over the whole of the city. (2) That water gas should not be supplied to houses until the fittings were certified to be sound. (3) That the Local Authorities should have power to examine the gas for carbonic oxide, as in the case of sulphur compounds and other impurities. (4) That gasfitters should be certified and registered, as in the case of plumbers. (5) That only approved fittings should be used, and that they should be subject to examination, as in the case of water-fittings.

The proceedings were resumed for the seventh time on May 24, when

Mr. G. C. TREWBY, *Consulting and Constructing Engineer of The Gaslight and Coke Company,*

related his experiences. He stated that, in the first instance, the action of his Company in connection with water gas was in consequence of the labour trouble in 1889. The men who were employed in making

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and the School of Sciences): "No doubt the danger of poisoning exists with all gases containing carbonic oxide; and coal gas is not exempt from the latter, as it can contain as much as 12 per cent. of its volume. But I think that the danger, which could only have sad consequences in exceptional cases, and through a sort of fatality, has been exaggerated. Further, the use of water gas has never been prohibited in France." Dr. R. Ogden Doremus (Professor of Chemistry and Toxicology, Belle Vue Hospital Medical College, New York): "The trivial variations in the gases made by various processes is of no importance in regard to health, excepting as to the products of their combustion. In this respect water gas is superior to all others, as it does not contain impurities existing in gas manufactured from bituminous coal." There were also opinions from Dr. E. G. Love, Analytical Chemist and Official Gas Examiner of New York City, Dr. Henry Wurtz, Dr. Walter Hempel, and Herr. Rudolph Wagner.

coal gas were not of any very high class. They did not respect agreements; and therefore they might leave a town in darkness. He spoke from his own experience, unfortunately, at Beckton. The Company heard that similar trouble had been surmounted in America by the introduction of carburetted water gas; and so in the year named, he visited New York, Boston, Portland, Montreal, Toronto, Buffalo, Indianapolis, Chicago, St. Louis, Cincinnati, Pittsburg, Baltimore, Washington, and Philadelphia, in nearly all of which towns carburetted water gas was distributed. In Chicago it was in use entirely; and in New York to a very large extent. His investigations were addressed principally to the utilitarian view of the question; but he made inquiries in Chicago with reference to gas poisoning, and was informed that they did not get any cases there. The result of his report to his Board was that he received instructions to put up plant; and at the present time the Company had at Beckton plant to manufacture 7,500,000 cubic feet of carburetted water gas, at the Bromley works 3,500,000, at Kensal Green 4,000,000, and at Nine Elms 2,700,000—making a total manufacture of carburetted water gas of 17,700,000 feet. Taking the maximum manufacturing power of the Company as 100 millions, this would represent about 17¾ per cent. But the Kensal Green works were by themselves, and there was no mixture of gas from other stations with the gas sent out from that one; so that there it would represent about 40 per cent. of the total manufacturing power. As a matter of fact, they had been working there for some little time at about 33 per cent.—that was, 33 per cent. of the whole gas sent out. They found they could manufacture carburetted water gas, light for light, much cheaper than coal gas. Having stated the other recognized advantages of the system, witness said that one result of the introduction of water gas was that it had brought down the price of cannel 8s. per ton; the previous price being about 55s. His Company bought very little cannel now; but they had paid as much as 75s. to 80s. a ton for Australian shale.* Then the manufacture of water gas enabled them to use a larger proportion of the surplus coke; and his Directors thought that, if the price of oil would enable them to manufacture water gas as cheaply as at present, future extensions should be made on this plan. The capital, too, was very much less than with coal gas. His Directors would be very sorry to limit the carburetted water gas, because they looked upon it as so useful for emergency purposes. Of course, if any danger could be proved it would be to their interest to limit it; but up to the present, no cases of gas poisoning had been brought to their notice. At the Kensal Green works, they had been making the carburetted water gas 3d. or 4d. per 1000 cubic feet cheaper than coal gas. They did not make periodical analyses of the gas; but he had one from the Kensal Green works, showing 14·6 per cent. of carbonic oxide on Dec. 17, 1895; and this would be about the ordinary proportion. The percentage in the coal gas there was very low—not more than 4 or 5. They had had no complaints of any sort concerning the use of water gas—not even as to the burners in use previously being unsuitable; but they had had the governors on the street lamps altered to pass gas of higher specific gravity. He might remind the Committee that the Company had to face very keen competition with the electric light; and, therefore, it was necessary to bring the cost of their gas down to the lowest possible point. Only about one-quarter of the men were required to produce water gas that were needed for the same amount of coal gas. Witness's attention was next directed to the following calculation which appeared in a statement he had submitted to the Committee: The proportion of the manufacture of coal gas and carburetted water gas based on the amount of coke made by the former necessary to supply fuel for the latter is—

—	Coke and Breeze for Sale.	Gas.	Per Cent. of Total.	Percentage of Carbonic Oxide.
	Lbs.	Cub. ft.		
One ton coal carbonized makes . . .	1232	10,000	23½	8
38 lbs. of coke make 1000 cubic feet of water gas; so . .	1232	32,400	76½	28
		42,400	100	23·3

Witness said this calculation was intended to show the proportion which the two gases would assume if they made only enough coal gas to produce coke in sufficient quantity to supply the water-gas plant. He put these figures down assuming that the cost of manufacturing coal gas was very high and water gas very low. Then they would only produce sufficient coke to supply the water-gas plant. "Given" (submitted the Chairman) "your present data, if you were left an absolutely free hand to use as much carburetted water gas as you liked, your opinion is that you would arrive at a proportion of three-quarters of carburetted water gas and one-quarter of coal gas?" "Yes," replied witness. Of course, if they brought into use plant for producing such an amount of carburetted water gas, it would be extremely difficult afterwards to change it. The work of making carburetted water gas was more healthy than the filling of coal-gas retorts. Uncarburetted water gas could be used for incandescent gas lighting; and off-hand, he thought such a gas would make a difference of about 6d. per 1000 cubic feet in the cost of manufacture. But there were other things which would also have to be taken into account. The Company having used carburetted water gas for some years, Mr. Cunynghame expressed a desire to know whether witness could give an estimate of the benefit which the consumers had derived in the price charged them—could witness give the Committee any encouraging figures to make them think that the consumers had been benefited? Witness answered that, if it had not been for the carburetted water gas, the price would have been higher than it had been. They had not used the carburetted water gas up to the present to any large extent—only about 17 per cent. of the total. The Company were charging 3s. per 1000 cubic feet; but the price had only just been raised from 2s. 10d. Mr. Cunynghame: In spite of water gas being put on? Witness: Yes; and he added, in reply to the Chairman, that they had had to charge largely on their reserves. Speaking next of the illuminating power of the gas, witness remarked that at present people who were using ordinary gas were, to some extent, paying for what they did not want. If they used Welsbach burners, they would not require gas of so high a candle power as the Company were obliged to give them; and if the illuminating power was lowered, it would tell against the manufacture of carburetted water gas. The proportion of carbonic oxide in the gas supplied by his Company in different parts of London might vary, because at some of the works they had no carburetted water-gas plant. As a rule, at Kensal Green, they put 33 per cent. of carburetted water gas into the coal gas; but, in case of emergency, it could be increased to 40 per cent. They had also an emergency increase at the Bromley works. Putting the percentage of water gas up to 40 at these works would raise the carbonic oxide to 16 per cent. This would be the very highest in foggy weather under present conditions; but the Company had no intention of limiting themselves to any such amount. Regarding domestic gas-fittings he thought it would be a good thing if they were tested by some authority. The Company put in the fittings for the slot-meter system; and, in their own interest, they did this work properly—the fittings being tested thoroughly before they were handed over to the consumer.

The only other witness at this sitting was

Sir Edward Frankland, K.C.B., F.R.S.

He confessed to having had no recent experience in the manufacture of water gas. His practical acquaintance with it was in 1852-3; and it was then being used in the making of gas by the so-called hydrocarbon process. This was not the same system as was ordinarily used now; and it was not a commercial success. In 1884, he saw the newer processes carried out in America on a very large scale. In water gas, without the illuminating agent, there would be about 33 per cent. of carbonic oxide; and probably 18 or 20 per cent. would be the average in carburetted water gas. The Chairman observed that they had evidence that the actual amount in the latter was somewhere about 30 per cent. Witness replied that it would be, if a very rich carburetting vapour were used; it would necessarily only dilute the pure water gas very little, and this would necessitate there being a large percentage of carbonic oxide. Admitting that this was a very poisonous gas, he was asked whether he had formed any judgment as to how far this fact ought to influence the Committee in the way of placing a limit upon the restriction of water gas; and he replied that he did not think there was any more than ordinary risk in lighting by any process. In electric illumination, people got killed occasionally by electric shocks, and also by ordinary coal gas in a closed room, although no doubt the risk would be doubled if there was twice as much carbonic oxide in the gas. Following this admission up, it was put to witness, and he agreed that, if the ordinary gas contained something like 5 to 8 per cent. of carbonic oxide, and carburetted water gas contained about 30 per cent., the risk would be increased three or four times. He could speak very broadly from his own experience as to injury to health arising from carburetted water gas. For two years, he had almost daily experience with workmen engaged about a place in Manchester where there was carburetted water gas used; and there was no apparent injury to health. He, however, thought that some limit should be put on carbonic oxide; and, if he were pressed on this point, he should say 25 per cent. Asked whether he was aware that this would, according to his own calculation of the amount of carbonic oxide in carburetted water gas, allow its use unmixed with coal gas, witness replied that he was; and, by carburetting, the percentage would be reduced to about 25 per cent. He would allow the use of pure water gas if the odour were sufficiently strong to give warning of an escape. He did not think a more stringent limit than he had named should be imposed; and so perhaps it would be rather superfluous to make a law placing the limit at 25 per cent. In other words, his opinion was that the number of deaths likely to occur from the unlimited use of carburetted water gas was not sufficient to compel the Government to pay attention to it. At the same time, he agreed that a large percentage of carbonic oxide constituted an additional risk.

(*To be continued.*)

* Witness subsequently sent a statement regarding the price of cannel. The price of Lesmahagow in 1891 was £1 9s. 11d., 1892 £2 14s. 9d., 1894 £1 10s. New Boghead in 1892 cost £2 2s., 1894 £1 15s., 1896 £1 14s., 1897 £1 13s., 1898 £1 12s. The price paid for Newbattle in 1891 was £1 4s. 11d., 1892 £2 8s., 1893 £2 10s., 1895 £1 9s. 6d., 1896 £1 8s. and £1 4s., and 1897 and 1898 £1 4s.

The Recent Case of Suffocation at the Bury Gas-Works.—The Bury Town Council have decided to allow the widow of John Lee, who was recently suffocated at the gas-works (*ante*, p. 87) 5s. a week for a year, although she has no legal claim upon the Corporation; the death of the unfortunate man having been caused by his disobeying instructions.

The London County Council and The Gaslight and Coke Company's Bill.—This Bill was down for second reading in the House of Commons on Monday last week; but it was deferred till to-day, when the London County Council will, on the recommendation of the Parliamentary Committee, hold a special meeting to consider and decide, under the Borough Funds Act, 1872, whether the Council should oppose the Bill.

The Taxation of Gas in Italy.—The Chairman of the Continental Union Gas Company (Mr. Arthur Lucas) has invoked the powerful aid of the Editor of "The Times," on behalf of the 1600 English shareholders in the Company, by the insertion of a letter dealing with the above subject, on which, it may be remembered, he made some significant observations at the last meeting. He says: "A Commission of 15 members has been appointed to confer with the Finance Minister at Rome on the Budget project to be shortly submitted to the Chamber of Deputies. The Italian journals state that this Commission is in favour of a special tax on the Companies lighting various cities with gas; and, as almost all the concessions are to English, French, Belgian, and German Companies, the tax would be largely one on foreigners. Moreover, as the proposed tax is to be on the selling price, it will press most unduly on those Companies who are charging the low rates. In the principal city lighted by the Continental Union Company, the cost is 12c., and the price charged in the suburbs is 14c., per cubic metre. A tax of 1c. per cubic metre at once confiscates half the profit; and if, as suggested, the tax of 2c. now paid by the consumer is to be paid by the Company, the new law will be tantamount to the confiscation of the concession lately renewed up to 1924, under most onerous terms as to price of gas, from the Municipality of Milan." Mr. Lucas characterizes the taxation project as one which is "seriously detrimental to Italian credit."

CLACTON-ON-SEA GAS AND WATER ARBITRATION.

Monday, Feb. 27.

(*Before* Mr. G. H. Hill, *Umpire.*)

An arbitration to fix the purchase price to be paid for the undertaking of the Clacton Gas and Water Company by the Clacton-on-Sea Urban District Council, was commenced to-day at the Westminster Palace Hotel. Mr. Charles Hawksley was Arbitrator for the Council; and Mr. Corbet Woodall for the Company.

Mr. Balfour Browne, Q.C., and Mr. Fleetwood Pritchard appeared for the Company; Mr. C. A. Cripps, Q.C., M.P., and Mr. Frere represented the Council.

Mr. Balfour Browne, in opening the case for the Company, said that Clacton-on-Sea was founded in 1870 by an enterprising engineer named Brough. Building went on rapidly; and a gas and water supply was soon needed. In 1875, the Clacton-on-Sea Gas and Water Company was formed. In order to simplify matters, Counsel proposed to deal with the gas and water separately, taking the gas first. In 1876, the Company obtained a Provisional Order containing the usual powers, and fixing the capital at £5000 each for the gas and the water undertakings. In the session of 1885, another Provisional Order was secured authorizing a further £5000 of original share capital and £20,000 of additional share capital in respect of the gas undertaking—making for gas purposes £30,000 in all. The £10,000 original capital bore 10 per cent. interest; while the additional capital raised under the auction clauses carried 7 per cent. The Provisional Order also authorized the Company to borrow not exceeding £7500 upon mortgage of the gas undertaking. According to the tables of Messrs. Alfred Lass, Wood, and Co., which Counsel put in, it appeared that the original capital had all been issued and paid up, and the borrowing powers exercised to the full extent; while of the additional 7 per cent. shares of £5 each 500 had been issued—leaving £17,500 of unissued capital in hand. Premiums amounting to £70 were realized on the sale by auction in 1897 of 7 per cent. shares; but the expenses of the sale slightly exceeded this sum. At the end of 1898, the total capital expenditure had amounted to £18,714; leaving a balance in hand on capital account of £1286. The reconstructed gas revenue accounts for the years 1895, 1896, 1897, and 1898 showed that the receipts from sales of gas had been, for private consumption, increased with considerable rapidity; having been in those years £1704, £1956, £2538, and £3472 respectively. The receipts from public lighting, rental of meters and stoves, and from residuals had also increased. The reconstructed profit and loss (net revenue) account showed a balance of £1546 available for dividend at the end of 1898. Until 1885, the Company had paid no dividend; but from that year till 1895 they paid from 2 to 4 per cent. For 1896 they distributed 4½ per cent., and for 1897 6 per cent. on the ordinary shares and 4½ per cent. on the new 7 per cent. shares. The reconstructed profit and loss (net revenue) account showed gas profits transferred to profit and loss account £711 for 1895, £702 for 1896, £1008 for 1897, and £1460 for 1898. By the Provisional Order of 1876, the maximum price authorized was 7s. 6d. per 1000 cubic feet. In 1885, it was reduced to 6s. 6d. per 1000 cubic feet, and by a Special Act of 1898 to 6s. With this Special Act (though among other things it repealed the previously existing Acts and Orders) the Court had nothing to do, because it provided that for the purpose of determining the value of the undertaking the Acts and Orders should be deemed in full force. The authorized price must therefore be taken as 6s. 6d. per 1000 cubic feet. To private consumers, the charge had been 6s. 6d. per 1000 cubic feet to June, 1887, and it was now 4s. 6d., subject to discount. The works were modern, and would be capable of producing at very little extra expenditure 50 per cent. more than the present maximum demand. It was probably the growing prosperity of the Company which caused the Local Authority to determine to become the owners of the works. Negotiations went on; and ultimately an agreement was scheduled to the Company's Special Act of 1898, providing for the transference of the undertaking. Paragraph 4 of the scheduled agreement stated that the consideration for the sale should be a sum of money arrived at in accordance with the provisions of the Lands Clauses Act, "and on the basis of a compulsory sale." The agreement also provided for a sum of £4000 in full discharge of all claims by the Company in respect of back-dividends, and compensation to Directors, officers, and servants of the Company. It also provided for the taking over of the debenture debt. Counsel contended that the total net maintainable gas revenue (£1494) would provide the maximum dividends, and still leave a surplus profit of £319. The resulting figure of £1175, should be capitalized at 30 years' purchase; and this, *plus* the 10 per cent. compensation for compulsory sale, would bring out £38,775 as the value of the undertaking. To this sum there would have to be an addition for stocks to be taken over under the agreement at a valuation.

Mr. *E. W. Drew*, of Messrs. Alfred Lass, Wood, and Co., examined upon the tables put in, bore out the opening remarks of Counsel.

Cross-examined by Mr. Cripps, witness admitted that the 7 per cent. shares disposed of in 1897 by auction were sold practically at par, which meant 14 or 15 years' purchase of the full dividend. With regard to £517 preliminary expenses charged to capital account in 1879 and 1881, he thought this should have been charged to revenue many years ago. The item was made up of interest on outlay for capital purposes, some solicitors' costs, and loss on the working of the Company.

Mr. Cripps said he would agree that the accounts for 1896 showed a margin over the amount necessary to pay the maximum dividends on the gas capital; and therefore he would not challenge the initial figure of £1175. The question remained, however, as to what multiplier should be applied; and he could not consent to 30 years' purchase.

Mr. *Frederick Hunter*, Manager of the Company, gave evidence as to the general good condition of the works and their excess capacity. The actual expenditure in the account year upon repairs and renewals of works (10·34d. per 1000 cubic feet sold) was largely in excess of the average, and was attributable to abnormal expenditure on various works designed for greater efficiency and economy in the future.

In cross-examination, witness said the abnormal amount of gas shown as being taken in 1898 by the Grand Hotel at Clacton was due to a defective arrangement on the part of the hotel authorities.

Mr. *W. A. Valon*, in the course of a detailed description of the works, said there were four beds of seven retorts each, capable of a maximum daily production, when in full use, of 140,000 cubic feet of gas; the maximum daily make last year having been 85,000 cubic feet. Practically the only deficiency was in the matter of gasholder capacity. Taking the last three years, the average increase in the consumption had been about 30 per cent. In order to bring the capacity of the works up to 140,000 cubic feet per day, an expenditure of £3000 would be ample; and at the present rate of increase the 140,000 cubic feet would be reached in less than two years, therefore further extensions would be required in 1900. The net profits in that year, allowing for interest on additional outlay, would have increased by £909 over those of the account year. Under these circumstances, witness considered the income was exceedingly well secured. Taking, for the purposes of his valuation, the gas profit, as per Messrs. Lass and Co.'s tables, at £1460, witness added to this sum £334—the difference between 10·34d., the actual expenditure on repairs and renewals per 1000 cubic feet sold, and 5·50d., which he considered was an ample allowance, bringing out a total, after deducting £300 interest on mortgages, of £1494. Maximum dividends on the issued capital requiring £1175, there was a surplus of £319. Adopting 30 years' purchase as the fair multiplier of the maximum dividends and interest, produced a total of £35,250. To this he added 10 per cent. for compulsory sale—making £38,775 as the total value of the undertaking, exclusive of stocks. He estimated the value of the stocks as at June 30, 1899, at £350.

In cross-examination, witness said he certainly thought that in a case of this kind, where the original capital might almost be regarded as preferential capital, 30 years' purchase was a reasonable figure to adopt. He asserted that the accounts presented by the Corporation in the Morley case showed a deficiency. If the Morley undertaking was worth 25 years' purchase, this Company was worth more than 30 years. As a matter of fact, he believed the award in the Morley case was nearer 40 years' purchase. Even if a company had only commenced to earn dividends, their future income might be as secure as if they had paid dividends regularly for twenty years previously.

This concluded the evidence for the Company.

Mr. Cripps, in opening the case for the Council, re-asserted his concurrence with the figure of £1175 as the amount to be capitalized. Inasmuch, however, as the Company could never divide more, he contended that the number of years' purchase should be 28½. There was nothing exceptional in the case which would justify an exorbitant number of years' purchase. Here the income was admittedly stationary; and 1898 was really the first year in which sufficient money had been earned by the Company to enable them to pay maximum dividends. Even in this year, he maintained that the free income, after deducting £300 for the mortgage interest, was only £1160, and therefore not quite sufficient to cover the maximum dividends. The gross income in 1898 was £3472; but of this from £300 to £400 came from the Grand Hotel alone, where the gas was used for power purposes only. The hotel people had often threatened to provide for themselves. Therefore the income was not at all so secure as had been stated. Adopting 28½ years' purchase, the figure obtained would be £33,487. From this, it would be right to deduct £1285, the balance unexpended on capital account; and this left £33,202. He thought it was fair to purchase from the Company on the basis of the maximum dividends on the whole amount of capital. Turning to the question of compensation for compulsory sale, Counsel contended that, as the Company under the agreement received £4000 in full discharge of all claims in respect of back-dividends and compensation to Directors, officers, and servants, and the only expense to which they would be put was the cost of winding up, from 1 to 2½ per cent. was an ample and fair allowance to the selling body for any damage they might suffer by reason of the transfer. Of course, 10 per cent. was the most that was ever given. Allowing, however, 5 per cent., the figure which he asked the Arbitrators to award was £33,812, *plus* an estimated amount for stocks to be arranged at a later date.

Mr. *E. H. Stevenson* said he thought there was a future for gas supply in Clacton; but it entirely depended on the progress the place made. Many a watering place suffered a set-back, and might have to wait some years before it advanced again; and it was quite on the cards that this might happen to Clacton. He did not think the undertaking was worth more than 28½ years' purchase. In his opinion, 5 per cent. for compulsory sale was amply sufficient.

In cross-examination, witness said the Morley case was the only occasion on which he allowed 30 years' purchase; and that was a Company who earned nearly 25 per cent. more than their maximum, and had large excess works with one of the lowest prices for gas in England. In that instance he allowed 10 per cent. for compulsory sale, because Counsel on the other side said that the Lands Clauses Act carried it. He had also allowed a further 2½ per cent. for the cost of re-investment, because that was another thing agreed to by the other side.

By Mr. Corbet Woodall: With the present price of gas, he regarded the possibility of a Company or Local Authority at Clacton establishing the electric light as a serious item to consider.

Counsel for the Company having replied, the case as affecting the gas portion of the undertaking was concluded.

The proceedings were then adjourned to yesterday, March 6.

NEWTOWN WATER ARBITRATION.

Wednesday, Feb. 15.

(*Before Mr.* James Mansergh *as Arbitrator.*)

This was an arbitration, held at the Westminster Palace Hotel, to fix the price to be paid by the Newtown and Llanllwchaiarn Urban District Council to the Newtown and Llanllwchaiarn Water-Works Company for the acquisition of their undertaking.

Mr. Balfour Browne, Q.C., Mr. A. J. Ram, and Mr. Honoratus Lloyd appeared for the Company; and Mr. C. A. Cripps, Q.C., M.P., and the Hon. J. D. Fitzgerald, Q.C., represented the Council.

Mr. Ram, in opening, said the proceedings were under an Act of last session, which authorized the Council to buy compulsorily the undertaking. The Company were incorporated under an Act of 1872, with a capital of £12,000, in 1200 £10 shares (which had been paid up). They had also power to raise £3000 on mortgage, which had been done at 4 per

cent.; the rate of interest being reduced last year to 3 per cent. The total area of supply was 34,387 acres, of which only 7187 acres could be supplied by gravitation. The district for the most part was purely agricultural, and no request had ever been, or was likely to be, made to supply the greater part of it. The Company, under both the Act of 1872 and that of last year, were only bound to supply by gravitation; and there was no obligation to give a constant supply. The population in 1891 was 6610; and it was probably now 7000. The town consisted of the parishes of Newtown and Llanllwchaiarn; the rateable value of the former being £18,685, and of the latter over £10,000. The drainage area was 1821 acres, and the reservoir of the Company had a capacity of 13 million gallons, which represented the rainfall of only 57 acres. The 57 acres yielded 70,680 gallons a day; and the reservoir would also intercept the dry-weather flow from the remainder of the watershed—a daily supply of 308,820 gallons. The reservoir was 662 feet above Ordnance datum; and the lowest point of supply was 317 feet. There was no service reservoir, and no filter-beds; but the Company possessed land which was available for filtration purposes below the reservoir. The daily supply to the town in 1898 was 151,000 gallons, 11,546 gallons of which were for trade purposes. This gave a domestic consumption of 24·4 gallons per head. Of the population of 6000, about 5000 were supplied by the Company. The net water-rental, which was £558 14s. 1d. in 1878, grew to £1382 14s. 10d. in 1898; the average annual rate of increase for the last fifteen years being 2·11 per cent. compound, or in the last three years 3·02 per cent. The dividends had risen from 3 per cent. in 1877 to 11 per cent. in 1898; 2 per cent. in the latter year being out of the reserve fund. The Company were on the eve of paying maximum dividends. There was prospective value in the concern arising from houses not yet supplied, and which could be supplied without further expense to the Company, as they were all adjacent to the existing mains; from new buildings being erected; from power to charge by meter a number of buildings—warehouses, schools, &c.—which were now charged on a lower scale; and from power to charge certain other tenements which had not yet been made to pay the full rates. The water had been analyzed from time to time, and the quality was always found to be good. In consequence of there being a few farms above the intakes, however, it was proposed that the water should be filtered; and a sum would be allowed the Council for this purpose. There had been complaints of want of pressure in the higher parts of the town; and to remedy this the Engineers suggested the laying of a 7-inch main for the whole town, and the provision of some other small works, by which full pressure would be ensured to all parts. Allowance in the valuation would also be made on this account. The valuers for the Company commenced with the net revenue for the year 1898 (£1050), which they capitalized at 36·36 years' purchase—£38,178. Then they took the balance of maximum dividends for the year 1899, which they put at £150, and discounted back one year. Applying to this the same multiplier, gave £5307, and made the total £43,485. From this was deducted the expenses in connection with filtration, the 7-inch main, and the service tank necessary to place the Company in a first-class condition. The present value of back-dividends was then considered. In this way, the final figure of £41,278 was arrived at. Some claims also had been made on the Company by riparian owners; and two were now pending. The best thing would be for the Company themselves to undertake to deal with these, and thus remove them from the arbitration. In conclusion, Counsel stated that the Company would discharge the debt of £3000.

Mr. *Drew*, of Messrs. Alfred Lass, Wood, and Co., put in tables relating to the position and accounts of the Company. For the last three half years, full statutory dividends had been paid, though the Company had not earned them in those periods.

Mr. *E. K. Burstal* gave evidence bearing out Counsel's opening statement. The total amount of water which could be supplied per diem from the reservoir and stream was over 300,000 gallons; whereas the consumption was 151,000 gallons daily. It was not necessary to filter the water; but to bring the Company to the highest standard, he made provision for filters. In his valuation, he adjusted the total income for the year ending Dec. 25, 1898 (£1382 14s. 10d.) on the basis of the receipts for the first half of the first quarter of 1899, which made the total figure of income for the year £1558 0s. 6d. From this he deducted 24 per cent. to represent the working expenses, leaving £1184 2s. This figure he capitalized at 33⅓ years' purchase, which gave £39,470. The amount required to put the works in a thoroughly first-class condition for the present population supplied, he put at £6287; being the cost of new filter-beds, water-tank, 7-inch main, balance tank, and capitalized cost of cleaning the filter-beds. From this sum, however, he subtracted £1625, half cost of the new 7-inch main; being the portion due to prospective value of the undertaking, and not required for present necessities. This left £4662, which reduced the £39,470 to £34,808. This sum, *plus* the usual 10 per cent. allowance for compulsory purchase, became £38,288 16s. The net prospective value, after allowing for expenditure necessary to earn the increased income, and discounting back to present value, he calculated to be £2204, which, added to the £38,288 16s., gave a final total of £40,492 16s.

In cross-examination, witness agreed that between 1881 and 1891 the population decreased by 560. A number of questions were put to witness suggesting that the water was likely to be polluted by drainage from farms, that the storm-water channel beside the reservoir was liable to burst (and had burst on one occasion), and that in times of flood water would frequently overflow from the storm-water channel and pollute the reservoir. He, however, denied the probability of these things occurring, and said he was unaware that the channel had burst.

Mr. *Henry Rofe* presented a valuation very similar to that of Mr. Burstal and to the figures given by Counsel in opening. There was no more real perpetuity in this world than that of a really first-class waterworks; and such undertakings ought to be dealt with on the 2¾ per cent. table, which gave 36·36 years' purchase. His final figure was £41,278. He included in this an allowance of 1½ per cent. for brokerage, re-investment, and delay, and ignored the 10 per cent usually claimed for compulsory sale, because he did not understand what this figure was intended to cover.

Mr. *William Richardson*, living in the highest part of Newtown, said at one time he had to complain of the water supply; but since the fixing of a tank, he had had no cause to grumble.

Mr. *Blunt*, a consulting chemist, said he had made several analyses of samples of the Company's water, which showed that they were free from pollution, and quite fit for domestic use. They contained a little vegetable, but no animal, matter.

Thursday, Feb. 16.

At the commencement of the proceedings to-day, some conversation passed between Counsel regarding the quality of water, in the course of which

Mr. FITZGERALD said his position was that if proper measures were taken with regard to the farmhouses and gathering grounds, and the water was sufficiently filtered, it would be good for domestic use. It would be necessary to do something with regard to the farmhouses; and an allowance should therefore be made for this purpose.

Mr. RAM intimated that, under these circumstances, he should call no more evidence.

Discussion then took place as to the claims of riparian owners for compensation now pending; one being for £975, and another for £166.

Mr. RAM eventually undertook to remove the matter from the present proceedings by pledging the Company to deal with them, and giving the Council an indemnification in regard to the matter.

Mr. FITZGERALD, in opening the case for the Council, said Newtown was not an increasing place; the population having diminished according to the last Census returns, while of late years the Welsh flannel trade, of which Newtown was the centre, had been depressed. Within the last three years, the water-rental had remained practically stationary. There was a difference between the accountants as to what the net income of the Company was in 1898. Messrs. Lass, Wood, and Co. put it at £1050, and Messrs. Cash, Stone, and Co. at £1020. He detailed the items in difference, and went on to suggest other adjustments of the £1020, including a deduction of about £97 in respect of increased rates which the Company would have to pay. The Company's valuers, not content with taking 1898 (about as favourable a year as any in the history of the Company), put on a sum of £150 to the net profits. The Company had no new consumers; but in a large number of cases they had increased the rates. Though these increased demands had not been paid, as far as they knew, yet the Company said they gave an ascertained increase. If the operation suggested would be profitable, it would have been done in the past; and the fact that it was not done, showed it could not be done—especially having regard to the fact that there was an abundance of wells, streams, &c., from which, in case of excessive charge, the people could supply themselves. With regard to the income that was to arise from the 180 houses now unsupplied, Counsel said the Company had never been able to induce the owners or occupiers to take a supply, they being satisfied with the water they obtained elsewhere; and it was extremely doubtful if, after the purchase, the Council would be more successful. Having regard to the history of the Company and the existing conditions of the town, he suggested 30 years' purchase of the concern as very liberal; and he pointed out that even the large London Water Companies' stock could be bought to pay from £3 2s. 9d. to £3 19s. 6d. per cent. It was, of course, absurd to put a value on the Newtown Company in excess of that of the London Companies. The items in respect of which deductions were suggested by the Company's valuers would have to be made; and the only question would be whether the amounts allowed would be sufficient. There would also be expenditure to prevent impurities from the gathering ground getting into the water, and to render the reservoir and storm-water channel really safe and serviceable. There was no prospect of back-dividends being paid within a reasonable time; and therefore nothing was allowed for them. As to the allowance for compulsory sale, Counsel had always thought Companies were entitled to claim in respect of cost of winding up the concern and re-investment. The former had been provided for. For the latter, Mr. Rofe allowed 1½ per cent.; and Counsel was content with this figure.

Mr. *William Cash*, of Messrs. Cash, Stone, & Co., handed in tables relating to the accounts of the Company. He made the balance of revenue for the year 1898, £1020 17s. 8d. Witness detailed several small items in which he differed from the accountants on the other side. The Company had recently had their assessment raised from £167 10s. to £919 15s. They had appealed against this; but no decision had yet been given. The Company admitted the increase to the extent of £695; and distributing this sum among the parishes in which the property was situated—and in which the rates varied largely—according to the proportion under the old assessments, gave a sum of £162 6s. 6d. to be paid in future by the Company, or an increase of £97.

Mr. *Edward Powell*, Solicitor, said he represented the Council in the arbitration. The population had steadily declined between the years 1841 to 1891, with the exception of one decade when it increased slightly owing to some speculative gentlemen erecting buildings, and so causing prosperity for a few years. The place had declined since, and in his opinion was declining now. The School Board had been considering the question of procuring an independent supply; and he was sure the Board would not consent to their charge being increased from £15 to £105, as was proposed by the Company. Nor would the town generally pay the increased charges. The shares of the Company had recently sold at £13 or £14 each.

Mr. *John Humphreys*, Chairman of the District Council, gave evidence as to the pressure of the water being insufficient, and to great depression existing in the flannel trade.

Colonel *E. Pryce Jones*, M.P., said he was interested in several large business undertakings in Newtown. He spoke as to the inadequacy of the pressure to supply even the basements of his factories. Owing to this inadequacy, the rates of insurance had been more than doubled. At one factory he had decided to sink a well.

In cross-examination by Mr. BALFOUR BROWNE, witness said he was increasing the number of hands he employed. The rise in the insurance rates might have had something to do with the class of goods he was storing.

Mr. *G. F. Deacon*, examined by Mr. CRIPPS, handed in a valuation of the undertaking, the final figure of which was £18,018 1s. 8d. The total profit for 1898 given by Messrs. Cash, Stone, and Co., was £1020 1s. 8d., from which he deducted £97 for additional rates on the new assessment, £40 for maintenance of filter-beds (including attendant's salary), £30 for additional cost of maintenance of mains and renewals, and other smaller items totalling £203 15s. 2d. This left £816 6s. 6d., which he had capitalized at 30 years' purchase, making £24,489 15s. He deducted

from this sum £6487 as the cost of putting the works into condition to supply pure and wholesome water at sufficient pressure to the existing population—leaving £18,002 15s. The items forming this sum of £6487 were: £205 for removing the existing head-weir and sluices of the reservoir, and substituting a head-weir between the stream and the reservoir; £1116 for repairing and enlarging the existing flood-water channel; £211 for reconstructing the waste weir to the reservoir; £425 for providing drains, carts, and cesspools for seventeen farms, at £25 each; £1750 for providing filter-beds and clear-water tank, including all valves and pipes, for 151,000 gallons a day, with standby; £1980 for laying a new 6-inch main from the existing 6-inch main through the filter-beds to the service reservoir above Bryn Bank Villas (the minimum required for the present population); and £800 for a balancing tank for 100,000 gallons a day. To the £18,002 15s. he added a further £15 6s. 8d. for five years' purchase of profit on fittings. He made no allowance for back-dividends, as they were too remote.

Cross-examined by Mr. Balfour Browne: The expenditure of £6487 would bring the concern up to a condition in which it would supply the water; but it would not be a first-class undertaking, such as an engineer at the present day would construct. The cost for filter-beds was heavy, but the outlay on small filter-beds was always greater than on large ones. The water was unsafe, because human excrement entered it; and none should be distributed without having been first perfectly filtered. It was suggested that it was the duty of the Local Authority, under the Rivers Pollution Act, to prevent this contamination; but witness held that attempts to exercise these powers had almost invariably failed. The water, he was informed, had often overflowed the carrier into the reservoir; it was impossible there could have been no overflow for eighteen years.

Friday, Feb. 17.

Mr. *Deacon*, in further cross-examination by Mr. Balfour Browne, admitted that he said in the Ambleside case he should have put the multiplier at 33 (instead of 30) years, if it were a statutory Company, and able to continue to supply the present population—which was the position of the Newtown Company. The reason he took so large a figure in the Ambleside case was that the undertaking had large prospective value. He allowed 33¼ years' purchase in the Harrogate case, because the value of a water undertaking in Harrogate was, other things being equal, undoubtedly higher than that of a water undertaking in Newtown. He agreed that the final figure of his valuation was only 17 years' purchase of what he took to be (after adjustments) the profit for 1898. He allowed 1½ per cent. for expenses of transferring the undertaking. In instances where the Company had done their duty, more should be allowed; but this was not the case here.

Mr. *G. H. Hill* presented a valuation agreeing with that of Mr. Deacon. It was desirable and necessary that works should be carried out to prevent pollution arising from farms on the drainage area. The reservoir was in an unsatisfactory and unsafe state—the sluices being a source of danger; while the channel was not large enough to prevent flood water getting into the reservoir. He agreed that £1500 was sufficient for the work Mr. Deacon said ought to be done; but he (witness) thought more work than Mr. Deacon had stated would have to be undertaken, at extra cost. Having regard to the doubt that existed as to whether the town was not going down, he held 30 years' purchase to be fair. On the question of back-dividends, he pointed out that to reach the payment of maximum dividends the present income would have to be increased by £420, supposing the Company were now paying 6½ per cent.

Cross-examined: He did not agree that it would be a bad speculation for the Local Authority to purchase the concern if the town was going down. He did not know the Council proposed to insert a purchase clause in the Bill which the local Gas Company were promoting.

This closed the evidence.

Mr. Cripps, for the Council, said so far as the Accountants were concerned there was little difference—only £30—in the figure of annual value. But there was a considerable difference on the question of rates. The old assessment of the Company was £167 10s., whereas the new one was £919; and the Company admitted that it should be £695, or four times what it had stood at. A difficult question was to allocate this sum between the four parishes in which the property was situated, because the rates varied in these parishes from 5s. 10d. to 2s. 8d. in the pound. Even if it were all allocated to the lower parishes, it meant a sum of £70 8s.; or, allocating it in the future to the various parishes in the same proportion as in the past, as the Council's valuers had done, a figure of £97 8s. 6d. extra was arrived at. On the highest basis, the increase might become £150. The deductions which the Council held should be made reduced the annual value to £816 6s. 6d.; and the question was how this was to be capitalized. It was admitted that a thoroughly good water concern in a town of normal growth, and with a normal number of consumers, should be capitalized at 33¼ years. If this were so, surely 30 years in this case was fair—even favourable. Mr. Rofe's figure of 36·36 years it was not necessary to criticize, because it was impossible under present conditions. With regard to the allowance for compulsory purchase, Counsel did not quarrel with Mr. Rofe's 1½ per cent. to meet incidental expenses, seeing that the Company were to have under the Act £300 for payments of costs, and a sum to compensate the Secretary. The price offered by the Council worked out to £32 per £10 share. With regard to back-dividends, he asked what were the prospects of a Company who had to make a large outlay in the future, who had a district in which the trade and population were decreasing, and who had never earned more than 8 per cent. They were absolutely *nil*, practically. The condition of the Company as regards profit was almost certain to be worse in the future than in the past; and if this were so, the claim for back-dividends would disappear altogether. If the increased charges were sought to be enforced, they would destroy the whole business, because the people would never stand them. He submitted therefore, in conclusion, that neither as regarded back-dividends nor prospective value should anything be added.

Mr. Balfour Browne, in replying on the whole case, said the figure of 36·36 years taken by Mr. Rofe was what he should apply to the concern, supposing it were absolutely of the first class. As a fact, his valuation, less deductions to bring it up to the highest standard, worked out to only 31·55 years' purchase. As to the expense of maintenance, the Company had taken the average of the last three years, which seemed to be fair and sufficient. Why, therefore, should an extra £30 be put upon them? Regarding rates, he admitted something must come off; but he could give little assistance as to what it should be. The multiplier of 30 years was grossly unfair. It took into consideration all the defects of the works; and then beyond this they deducted everything necessary to make the works perfect—reducing the final figure of their valuation to £18,018, or 17·8 years' purchase of the net revenue, adjusted and reduced as it was by the other side. This, he contended, was absolutely unfair. With regard to the expenditure on the reservoir, Counsel said it was to meet a contingency which might never occur, and which never had occurred. Why, therefore, were the Company to provide money to make the works theoretically perfect? There had been plenty of time for a burst to take place in the past; yet it had never happened, and there was no reason why it should occur in the future. The expenditure of £424 for works to secure the purity of the drainage area was entirely unnecessary, seeing that the quality of the water was not impugned, and that the Company had earned their income without it in the past. As to the town being in a decaying state, the accounts showed that the net water-rental had gradually and steadily increased since 1878; while Colonel Pryce Jones stated that the number of his hands had increased, and that he was erecting another mill. The increase as to the future was based on the supposition that the people of the town would go on taking simply what they had taken in the past, but at the increased and perfectly legal rate of charge. The increase in the water-rental in the past fifteen years was at the rate of 2·11 per cent. per annum; and assuming that this would continue for the next fifteen years, and deducting the expenditure required to earn the increase, it was calculated that the sum to which the Company were entitled was £2204. It could hardly be suggested, if the concern was worth anything at all, that it would not earn this sum in addition to its present income in the next fifteen years; and the Company were therefore entitled to it. In conclusion, he claimed an allowance for expropriation, and for prospects which the Company might have, and which could not be foreseen.

The proceedings then terminated.

The Arbitrator has since made his award; the amount of it being £27,616.

LIVERPOOL CORPORATION AND THE SUPPLY OF WATER GAS.

The Government to be Urged to Introduce a Bill in the Present Session.

In some respects, it will be noticed that the suggestions put forward on behalf of the Liverpool Corporation at the Home Office inquiry into the supply of water gas have been adopted by the Committee; and consequently, it is not surprising to find that the Council are anxious to see the recommendations pass into law. At their meeting last Wednesday, the Health Committee recommended—"That, having regard to the danger to health and life from the excessive use of water gas for illuminating or heating purposes, the members of Parliament for Liverpool be asked to press the Government to introduce a Bill in the present session to carry out the recommendations of the Water Gas Committee." Alderman Smith remarked that the gas question was one that affected the health and lives of a number of people. He did not think the recommendation went far enough. It ought to contain a request to Parliament to give the local authorities power to test the fittings used in gas consumption. The Corporation lighting inspector had told him that he had tested fifty or sixty houses taken at random, and had found that in none of those houses would the fittings bear ordinary pressure. An architect of his acquaintance had tried many new fittings, and had invariably found that even these would not stand ordinary pressure. The Gas Company took neither charge nor care of the fittings which the ordinary consumers used; and while the Corporation took stringent measures to prevent the waste of even a little water, they were absolutely negligent of so important a matter as this. The Health Committee should have no difficulty in carrying out a most efficient test in giving a little more per week to the men who lighted the lamps, and placing in their hands the testing of the fittings within their district. He therefore moved that the following words be added to the Committee's recommendation—"and to give power to local authorities, on payment of a small fee, to test the gas-fittings in houses within their authority." Alderman Cookson was quite in sympathy with Alderman Smith, and had no objection to make the addition. The Town Clerk pointed out that the recommendations of the Departmental Committee would cover the point. When the Bill came up for consideration, the Corporation would move in the direction indicated. Mr. Hartley Wilson said the gas question was becoming an increasing danger. If the Gas Company were not amenable to reason, then pressure must be brought to bear upon them. The proceedings were confirmed.

The Supply of Water Gas in Birkenhead.—Alderman Bloor, the Chairman of the Gas Committee of the Birkenhead Corporation, informed that body last Wednesday that he considers the report of the Home Office Committee on Water Gas is "a complete exoneration and justification of his Committee in their action over the water-gas supply."

New Joint-Stock Companies.—The Pioneer Electric Light and Power Company of China, Limited, has been registered with a capital of £3000, in £1 shares, to carry on in China, the United Kingdom, or elsewhere, the business of an electric light and power supply company, electricians, electrical engineers, and gas and mechanical engineers; and to acquire patents, patent rights, &c. The Electric Light and Power Company of Japan, Limited, with a capital of £3000, in £1 shares, will carry on in the Empire of Japan, the United Kingdom, or elsewhere, the business of a light and power company, electricians, and gas engineers; and will acquire any real or personal property, patents, patent rights, and inventions connected therewith. The object of the British Pioneer Electric Light and Power Company of India, Limited, which has been registered with a capital of £3000, in £1 shares, is sufficiently indicated by the title. The Omega Odourless Gas-Stove Syndicate, Limited, has been registered with a capital of £26,000, in £1 shares, to enter into an agreement with L. D. K. Stow and H. O. Strong, and to carry on the business of engineers, stove manufacturers, iron merchants, smiths, &c.

SOUTH SHIELDS GAS COMPANY.

The Annual General Meeting of the above Company was held last Tuesday—Dr. J. F. Armstrong in the chair.

The Secretary (Mr. J. H. Penney) having read the notice convening the meeting, the report and accounts, the principal items in which were given in the "Journal" for the 21st ult., were presented.

The Chairman, in moving the adoption of the report, said the proprietors had met under rather sad auspices, as they had lost their former Chairman, who for upwards of forty years presided over the Company. He (Dr. Armstrong) felt that he had lost a very estimable friend, and the Company a most worthy Chairman. Speaking to the business, he said that at the last annual meeting their late Chairman remarked that the account then presented was not a very brilliant one. This year he (the speaker) was sorry to say their account was again depressing and disappointing. The result of the first half-year's working was a great success. After balancing the accounts and paying the interim dividend, they had £2000 to the good. The Directors were sanguine that everything would work out all right at the end of the year, and that, after paying the usual dividend, they would have a good balance at the bank. From one cause or another, over which they had no control, their calculations were upset. When they went into the market for coals, they found the price had risen very considerably, and this ran them into an additional expenditure of £5000 a year. Their workmen also became restive, and applied for an increase of wages all round. After many conferences and deputations, and prolonged consideration, they granted an increase—not all round, but to the stokers and others. This amounted to £700 a year. The increase altogether amounted to £1300; but about £800, being for the laying of new mains, went to capital account, and did not detract from the balance of the present year. Then the repairs and renewals had been very excessive. They found it desirable to renew their mains in different sections of the town where they had been down for many years. When they put the contracts for the pipes on the market, many firms declined to supply them in consequence of being so full of orders; and they had to go round the country begging for pipes. The result was that, instead of putting the pipes down in the spring or summer, the work was delayed till the autumn. This naturally interrupted the flow of gas to their customers; but that was a matter which would not occur again; nor did he think the bill for renewals would be so heavy for some time to come. Another matter was that their coals did not yield the quantity of gas they expected. When the coal trade was busy, coalowners seemed to put anything on the market, without selecting or sorting in any way. They would find that the bulk of coal carbonized last year was 408 tons more than in 1897; while the gas produced was 558 cubic feet less. The receipts for coke and ammonia showed an increase of £2992; but for tar a decrease of £1123. Putting aside altogether what the residuals produced, the price of gas would have to depend upon the cost of the raw material—the coal. As coals went up in price, gas would have to go up as well. The Newcastle Gas Company realized this last July, and raised the price of their gas 2d. per 1000 cubic feet; and the South Shields Company now found they would have to do the same until coal went down again. This was, of course, against the consumers; but it was equally against the shareholders. Every 2d. they put on the price, the proprietors received 10s. per cent. less dividend; so that it cut both ways. The net revenue was £14,907, which was £2624 less than in 1897. After crediting the balances from that year and deducting the interest and interim dividend, the net revenue to be dealt with was £6098. The Directors recommended a dividend of 4¼ per cent., which, with the interim dividend of 4¼ per cent., made 8½ per cent. for the year. They had a reserve fund of £4810 which could be used for equalizing dividends only; and they proposed to take £944 therefrom to enable them to pay the dividend—leaving ½ per cent. to stand over to be dealt with in more prosperous times. The illuminating power of the gas had been well maintained during the year—always reaching about 16 candles, the standard required by their Act of Parliament. No doubt during the foggy and frosty weather they lost a good deal of naphthalene, which had great light-giving properties, and there might have been a temporary falling off in the illuminating power of the gas. Any sudden drop in temperature threw down naphthalene; and this could not very well be avoided.

The Vice-Chairman (Alderman Smith) seconded the motion.

Mr. Duncan joined issue with those who believed that gas consumption had gone down on account of the electric light; and he referred to Edinburgh, where the gas and the electric light were running together, and where the increase in the sale of gas had involved the city in a scheme for extending their gas-works. During 1898, while the South Shields Company had practically no increase in the sale of gas, had they no addition to the number of consumers?

The Secretary said there had been 404 new consumers.

Mr. Duncan asked if it was possible to have 404 extra consumers, and no addition whatever to the sale of gas.

The Chairman remarked that some of them were very small consumers. The taking up and laying down of pipes had prevented the gas passing through the mains to their customers as usual, and this accounted for some deficiency.

Mr. Duncan said that this brought him to a complaint he had to make in regard to the imputation cast upon the consumers in October last, when there was a serious lack of illuminating power in the gas supplied to the town. There were very strong complaints on this account; and the explanation given by their Engineer was that it was due to the fittings of consumers—in a town of 80,000 people! Such a statement as this being put forward on behalf of the Company ought, he thought, to have been contradicted forthwith. It was an insult to the intelligence of the people of South Shields.

Mr. Malcolm said he did not propose to criticize the balance-sheet, but would leave the ground clear for discussing such questions as the policy of drawing upon their very small reserve fund, raising the price of gas and its probable consequence, and other points that were involved. The report stated that there had been no material advance in the sale of gas. Were the proprietors to understand that in one of the most thriving and prosperous towns of the North of England there had been practically no increased demand for gas last year as compared with the preceding one? Was the consumption of gas in the community in a state of stagnation? Or was the electric light making such rapid strides that it was already affecting their sales? No. He could not come to these conclusions. But he did infer that the Company had not had the gas to meet the natural demands; and, if not, why not? He would indicate where he thought the alarm might be found. It used to be the custom to give in the report the total quantity of gas produced; but it had lately been omitted. He had therefore made up for the omission by doing some calculations of his own. They were these: Coals carbonized, 49,385 tons; gas made, 543 millions—say 520 millions; gas sold, 378 millions; used on works, &c., 70 millions; leakage, 31 millions. These figures totalled to 479 millions; making a deficiency of 41 millions—say 40 millions, which, at 2s. 6d. per 1000 cubic feet, equalled £5000. To put it another way, about 4000 tons of coal had been carbonized in excess to produce the results shown. This being so, there should have been at least £5000 more revenue available from this source, which would have met the deficiency in the statutory dividend. The sale of sulphate of ammonia amounted to £2000 for the last two years. He knew a Gas Company about half the size of their own which had received £3300 during the same period. If the figures he had laid before the meeting were correct, or nearly so, what had become of the 40 million cubic feet deficit. He had come to the conclusion that the plant was not in the condition it should be in for efficient and economical working. There had been reluctance to spend money on improvements, and some of the apparatus might have been allowed to become inefficient or antiquated—a most suicidal policy. From the position of the works in their rapidly extending district, there was nothing to prevent the Company being a most successful one, if properly managed. He had only one more suggestion to make, and that related to their Engineer. Mr. Warner had long served the Company, and he was considered a capable and efficient gas engineer; but he could not be expected to be now so physically capable of contending with the thousand-and-one worries incidental to gas-works management as he was formerly. He (Mr. Malcolm) therefore suggested that an active, efficient, and thoroughly experienced colleague should be at once appointed to assist him.

Alderman Bowman said the report before them was one of the worst ever presented to the shareholders, no matter which way they looked at it. It was a most miserable affair—a decreased dividend and £1000 taken out of the reserve fund to pay it with. This was not the worst. They had actually proceeded to increase the price of gas. It was bad policy, especially at the present time. The consumers never had worse gas, and never had such dirty gas. He took a very gloomy view of the prospects of the Company; but he did not blame the Directors for it. They had to deal with a strong competition in the electric light, and it was no use ignoring it. At the present time they had a consumer of gas who paid them £300 a year taking the electric light. The interests of the Company had been sacrificed on account of the management. As to coals and labour being responsible for it all, their labour expenditure only began in November; and the Newcastle and all other gas companies had to face the same difficulties in regard to the increased price of coal. The Newcastle Company had raised their price 2d. per 1000 cubic feet; but there the price was only 2s., whereas in Shields it was 2s. 8d.

The Chairman said there was 7 per cent. and 20 per cent. off the maximum; and the discounts were nothing like so high at other places.

Alderman Bowman said their prices were higher than in Newcastle or neighbouring towns. Would anyone say what was to be the future of the Company?

The Chairman: I have every confidence in its future.

Alderman Bowman said he was glad to hear it.

A Shareholder remarked that the price of gas at North Shields was 2s. 3d. per 1000 cubic feet, less 5 per cent. discount.

The Chairman complained that they were in unfair competition with the Corporation; for instead of having to meet dissatisfied shareholders when there was a deficit, they had only to go to the rates for it.

Alderman Bowman: Yes; and they are able to make this Company pay their share, too.

After some further discussion,

Mr. Duncan moved the following resolution: "That in the opinion of this meeting it is desirable that the Directors should confer with Mr. Warner, the Engineer, with the view of receiving his resignation." He was certain the Directors would not deal illiberally with Mr. Warner.

Alderman Bowman seconded the proposition.

Mr. Malcolm said this was far too drastic for him.

Mr. Warner, who said he spoke as a shareholder, thought they ought to have some consideration for between thirty and forty years' service, and for his professional and personal character. He agreed with Mr. Malcolm that there was £5000 deficiency. But where had it come from? There was an increase of £4000 in their coal bill for the year, and nearly £1000 increase in their wages. There was the £5000 deficiency at once. With reference to Mr. Duncan's comparisons, why did he go to Edinburgh? Why did he not go to London—to the Chartered Gas Company? That would have been fair and honest.

Alderman Smith said the Directors had obtained an expert young man, with splendid testimonials, from London, and he was already assisting Mr. Warner in carrying out the works.

Mr. Malcolm said it was a pity this fact was not stated before.

The resolution was then put; but only the mover and seconder and one other proprietor supported it.

The report was adopted, and a 4¼ per cent. dividend was declared; and after the usual votes of thanks the proceedings ended.

NORTH MIDDLESEX GAS COMPANY.

A Stormy Meeting.

Expectation of a little excitement at the half-yearly meeting of this Company on Friday last, at Winchester House, Old Broad Street, E.C., drew together a fair number of shareholders. That the Directors anticipated trouble is shown by the fact that, some days previously, they issued a circular to the shareholders referring to adverse criticisms made on the management by Mr. H. J. Robus at former meetings, and, in view of any action he might take on this occasion, they solicited proxies in their favour. They were, as the result, able to attend the meeting armed with a large number. But it was all labour lost; for, though considerable animation was infused into the proceedings by Mr. Robus, they had a

peaceful termination. Among the points with which Mr. Robus had expressed his dissatisfaction were the indifferent results of working, a defect in a newly-constructed gasholder tank, and the fact that a contract for water-gas plant had been let without competition. He also suggested that one of the Directors—Mr. A. M. Paddon—was identified with the firm who had secured the contract. At the meeting six months ago, Mr. Robus asked to see the contract; and, the Directors declining, he instituted legal proceedings, and so secured his end. The matter having been the subject of conversation in City gas circles lately, a representative of the "JOURNAL" applied for admission to the meeting last Friday, but this was refused by the Directors. We can therefore only give a general sketch of what took place, from inquiries made in different quarters.

On Mr. HENRY LOFTS taking the chair,

Mr. ROBUS suggested that the Press should be admitted; but the Directors adhered to their previous decision.

The MANAGER (Mr. C. H. Rutter), in the absence of the Secretary, read the notice convening the meeting, after which the report and accounts were taken as read.

In the report, the Directors stated that they had the satisfaction of announcing an increase in both the business and profits of the Company, exceeding those of any similar period in the history of the concern. The increase in the gas-rental for the half year was equal to 11·8 per cent., and for the whole year to 13·7 per cent. The return from residual products had increased from £1064 in the corresponding period of 1897 to £1535 in the past half year. The profit earned was nearly 30 per cent. in excess of the amount required for the payment of dividends and interest on loan capital. This satisfactory result, the Directors said, had been achieved notwithstanding heavy expenditure on the improvement and maintenance of the works and mains as a revenue charge. It was also mentioned that the carburetted water-gas plant had been completed, and successfully brought into service. The accounts showed that the capital expenditure for the half year amounted to £2859, of which £2074 was spent on the works. The revenue account recorded that 35,328,500 cubic feet of gas had been sold at 4s. per 1000 cubic feet, producing £7065; and that for public lighting and under contracts 3,073,425 cubic feet had been consumed, yielding £615. The total income was £9498, and the expenditure £6553—leaving as profit £2945. The net revenue account showed a disposable balance of £3030.

The CHAIRMAN, in moving the adoption of the report and accounts, referred to the progress made by the Company during the past year; and he felt sure that the accounts presented would be regarded as very satisfactory by the shareholders.

Mr. A. M. PADDON, in seconding the motion, compared the accounts with the corresponding period of 1897, pointing out the satisfactory increases that had occurred even under adverse circumstances. Coal had gone up in price; but, notwithstanding, they had been able to show an increased profit, due to larger consumption and better manufacturing and distribution results. The revenue, compared with preceding half years, showed increases of something like £900 and £500. The leakage of gas, he was understood to admit, had in the past been high—between 12 and 13 per cent.; and the sales of gas per ton of coal carbonized had not been so good as they could have wished. The carburetted water-gas plant had been completed, and was working very satisfactorily.

Mr. ROBUS pointed out that Mr. Paddon by his speech had fully justified the complaints of inferior working which he made at previous meetings. He was still dissatisfied with the position of affairs; and he did not think the accounts were accurate.

The CHAIRMAN pointed out that the accounts had been certified by the Company's Auditor, as well as by an independent firm of Auditors, and were perfectly correct.

Mr. ROBUS said that, from an inspection of the books, he found that part of the expenditure on capital charged in the accounts should have been charged the previous half year. He also referred to the splitting of the gasholder tank, and commented at some length on other matters.

Mr. CLARKSON suggested that the time of the meeting should not be wasted by listening to this "rubbish."

Mr. ROBUS asserted that Mr. Clarkson only held one share, while he (the speaker) was a considerable holder, and therefore had a perfect right to be heard.

A SHAREHOLDER remarked that he had listened patiently to Mr. Robus, but could not understand what he was driving at.

Mr. ROBUS replied that his object was to show that the Company had been mismanaged. Larger dividends and cheaper gas were all that he wanted. Amid much interruption, he went on to allude to the action he had taken in order to see the contract for the water-gas plant. Protests being raised against reference to this matter,

The CHAIRMAN said he must take the sense of the meeting as to whether Mr. Robus should continue to be heard.

Mr. CLARKSON moved that Mr. Robus be no longer heard; remarking that he should conduct himself as a gentleman.

Mr. ROBUS retorted that he was as much a gentleman as Mr. Clarkson.

The motion was seconded; but an amendment was carried to the effect that Mr. Robus be heard, provided he confined himself to matters before the meeting.

Mr. WHITE subsequently asked for information about the split tank to which Mr. Robus had referred.

Mr. JOSEPH CASH, the Consulting Engineer, supplied the information, and stated that the Company had purchased a piece more land, so that they could make a better backing for the tank.

Mr. JONES then commented on the insufficient supply of gas in the neighbourhood.

The report and accounts were eventually adopted; and dividends were declared at the rate of 10 per cent. per annum on the original capital and 7 per cent. on the ordinary capital, less income-tax.

The two retiring Directors (Messrs. Lermitte and Sampson) were re-elected; the former being proposed by Mr. ROBUS, who stated that Mr. Lermitte was the only Director at the previous meeting who was willing that he (Mr. Robus) should be allowed to inspect the contract for the water-gas plant.

On the re-election of the Auditor (Mr. Ernest L. Burton), it was suggested that two Auditors should be appointed; but the Chairman stated that there had been an independent audit on this occasion owing to private troubles of the Secretary. He was happy to say that the accounts were found in good order.

A vote of thanks to the Chairman terminated the proceedings.

PROVINCIAL GAS AND WATER COMPANIES.

Gas Companies.

In the past year, the Altrincham Gas Company made a profit of £7058; the revenue being £20,891, and the expenditure £13,833. The amount available for distribution at the recent annual meeting was £3718; and the Directors recommended the declaration of the statutory dividends, which would leave £576 to be carried forward. The bulk of coal and cannel carbonized was 13,360 tons; the sale of gas being 118,846,831 cubic feet. The residuals were: Coke, 8684 tons; breeze, 22 tons 17 cwt.; tar, 967 tons; and ammoniacal liquor, 1454 tons.

At the half-yearly meeting of the Brighton and Hove General Gas Company next Friday, the Directors will report an increase of 4·6 per cent. in the sale of gas for the six months ending Dec. 31, 1898, as compared with the corresponding period of 1897, together with a considerable augmentation in the receipts from residual products resulting from the higher prices ruling during the latter half of the past year. The revenue from the sale of gas was £69,556; from the rental of meters, fittings, and stoves, £4395; and from residuals, £14,597—the total receipts being £88,698. The expenditure on the manufacture of gas was £44,158—coal, coke, and oil costing £30,038—on distribution, £8266; and on management, £4226; the total expenditure being £60,521, and the balance carried to the profit and loss account £28,177. The amount available for distribution is £29,096; and the Directors recommend dividends for the half year at the rates of 11½, 8½, and 6 per cent. per annum on the various stocks of the Company. For the payment of these £23,768 will be required; and there will be left a balance of £5328. Under the supervision of Mr. Joseph Cash, the Company's Engineer, 34,745 tons of coal and 405,325 gallons of enriching oils were used in the manufacture of gas, of which 497,830,700 cubic feet were sold for private and public lighting. The estimated quantities of residuals made were: Coke, 21,176 tons; breeze, 1724 tons; tar, 414,871 gallons; ammoniacal liquor, 848,600 gallons.

The annual meeting of the Canterbury Gas and Water Company was held on Monday last week, under the presidency of Mr. D. Amos. The Chairman said the Directors congratulated the shareholders upon another successful year's working. At their last annual meeting, they had 200 prepayment meters fixed; and now they had more than 800. There had been a welcome revival in the value of coke, and a decided improvement in sulphate of ammonia. The water undertaking continued to give every satisfaction; and it was worthy of record that throughout the long drought of last year the Company's supply was in no way affected. He moved that a dividend of 4¾ per cent. for the half year ending Dec. 31 be paid on the original "A" and "B" consolidated stock and on the new "A" and "B" ordinary stock; making, with the interim dividend of 4¼ per cent. paid in August, 9 per cent. for the year. The report was adopted. At the close of the ordinary business, a special meeting was held to authorize the creation and issue of £2500 of new "A" stock for the purposes of the gas undertaking. The Chairman stated that all the gas capital was expended, and £940 beyond. Though the Directors, under the Company's Act of 1890, had power to borrow £9000, they thought it would be better to create new shares. The proposition was then put to the meeting, and agreed to.

In moving, at the recent half-yearly meeting of the Cork Gas Company the adoption of the report and accounts noticed in the "JOURNAL" last week, the Chairman (Mr. G. Lynch) referred to the electric light supply in the city. He remarked that though the Electric Light Company had been supplying their customers for nearly four out of the six months included in the past half year, there had been an increase in the consumption of gas. This, he said, was not surprising, considering that in all the cities where the light had been introduced the consumption of gas had augmented. As he anticipated would be the case, the parties who had taken the light had been disagreeably surprised on getting their bills for the December quarter—the one which ought to show the most favourable results as to price, owing to the longer hours of burning. In every one of the many cases that had come under the Directors' notice, the cost of the light had been greater than gas—in many instances more than double. In only one cases did they hear of it being cheaper; and when they looked closely into the matter they found that there had been a serious mistake, and that, after all, the electric light was much the dearer illuminant. Referring to the Company's success in the competition with the Electric Light Company for the lighting of the Lunatic Asylum, already noticed in the "JOURNAL," he said he considered that, in the case of an institution which was supported by the rates, the Gas Company, as the largest ratepayers in the city and one of the largest employers of labour, had a right to protest against the introduction, at increased cost, of a new and expensive luxury in the way of lighting, when the one in use was sufficient and satisfactory, and supplied by a Company almost entirely composed of citizens and ratepayers. Mr. Frank Mahoney seconded the motion, remarking that the very satisfactory increase in the consumption was due to the largely extended use of gas for heating and cooking purposes. Mr. Roche, on the part of the shareholders, said he might safely state that this meeting was one of the most satisfactory he had attended for the last twenty years. The report and accounts were adopted; and a dividend of 8 per cent. per annum was declared.

The annual general meeting of the Cradley Heath Gas Company was held on Tuesday last—Sir Benjamin Hingley, Bart., presiding. The report and accounts were presented by the Secretary and Manager (Mr. C. Dakin); and they showed a net profit of £3158. The quantity of gas made during the year was 86¼ million cubic feet, or 16 per cent. more than in the preceding year. The price of gas to small consumers was reduced 1d. per 1000 cubic feet on Jan. 1 last. It was also announced that, to meet the increasing demand for gas, considerable extensions of the manufacturing plant would shortly be necessary. Dividends of 10, 7, and 4 per cent. were declared upon the different classes of capital.

At the recent annual meeting of the Dudley Gas Company, it was reported that the net profit for the past year amounted to £6542. This enabled the Directors to declare dividends at 5 per cent. on the ordinary and preference shares, at 4½ per cent. on the new preference shares, and at the rate of 7 per cent. per annum on the stock. These dividends absorbed £2646, a similar amount having been paid on the 1st of September last. There was a balance brought forward of £2659, which has been increased to £3195. The sale of gas during 1898 consisted of 77,582,400 cubic feet at 3s. per 1000 cubic feet, 37,893,100 cubic feet at 2s. 9d., and 8,655,700 cubic feet at 2s. 6d.; yielding an income of £17,929, in addition to £2491 for public lighting and contracts.

At the half-yearly general meeting of the Eastbourne Gas Company on the 27th ult., the Directors reported that the profit on the revenue account was £6328, and the total standing to the credit of the profit and loss account was £16,934. Out of this they recommended dividends at the rates of 14½ and 11½ per cent. per annum, which would absorb £6093, and leave £10,841 to be carried forward. The Chairman (Dr. G. A. Jeffery, J.P.), in moving the adoption of the report, said the profit made in the past half year was £1125 more than in the corresponding period of 1897—£6328 against £5203—though coal had cost £1222 more, and repairs amounted to £740. This increase was due largely to the satisfactory disposal of the residual products, which brought in £1205 more; and the gas-rental was nearly £2000 higher. This was how they arrived at the profit, and how they made their dividend. The sale of gas had risen from 117,022,000 cubic feet to 127,632,000 cubic feet in 1898—a total increase of about 7¾ per cent.—which was exceedingly good. After giving other details, the Chairman mentioned that the total leakage for the year had been 4·1 per cent., which was very little. The whole of the works were in good—he might say first-rate—condition, which was a proof that there must have been good management, due chiefly to their friend Mr. Hammond, their Engineer, and the general staff, all of whom had worked together most harmoniously. Many people interested in gas undertakings had been complaining that, owing to the mild weather, they had not been able to get a sufficient return for their money. They in Eastbourne had also had mild weather; but notwithstanding this their profits had gone on increasing. Gas was the best light in existence—there was no jerkiness about it; and he was glad to see that almost every newspaper one took up alluded to the great revolution which had been effected by the incandescent gas-light, which was acknowledged to be cheaper than electricity. He found that Hove had decided to go in for the incandescent gas system in preference to electric lighting; and there was no denying the wisdom of this policy. They had only been incorporated for about a year; and the first thing they did was to get the best light for the town at the very cheapest rate. Mr. J. Farncombe, in seconding the motion, congratulated the Company upon their continued success, which he considered was largely attributable to excellent management and the long-continued energy of Dr. Jeffery as Chairman—a position which they trusted he might hold for many years to come. The report was adopted; and the proceedings closed with the usual complimentary votes to the Directors and to Mr. Hammond.

At the annual meeting of the East Grinstead Gas and Water Company, a dividend of 8 per cent. per annum on the "A" shares, and £5 12s. per cent. per annum on the "B" and "C" shares, free of income-tax, was declared, against 7 and £4 18s. respectively a year ago. Since the last annual meeting, the springs at Hackenden have been secured by the Company. They are considered an inestimable boon; and when the works are completed the whole town will be supplied from them, leaving the old works in reserve. Notwithstanding the dry summer, the street watering and the supply to houses was continued without interruption. The receipts from the sale of gas in 1898 were £3634, as compared with £3610 in 1897; and from water £1664, against £1428.

The half-yearly meeting of the Gloucester Gas Company was held last Tuesday. The report of the Directors stated that the accounts showed a satisfactory progress in the business. After providing for interest on mortgages, &c., the net profit was £3211. The Directors recommended the payment of the usual dividends upon the various classes of shares, which amounted to £3928, and required £717 from the undivided profits. In pursuance of the Company's Act obtained last year, the share capital was converted on Jan. 1 into consolidated ordinary stock, bearing a uniform rate of interest of 5 per cent. per annum. The report was adopted, and the dividends declared.

The annual general meeting of the Hertford Gas Company was held on the 23rd ult.—Mr. B. J. Gripper in the chair. The Directors reported a sum of £1439 standing to the credit of the profit and loss account, and available for distribution; and they recommended that, after paying the dividend of 5½ per cent. on the new preference shares, a dividend for the past year be paid on the original and new shares, at the rate of 7 per cent., free of income-tax. The price of gas was on the 1st of April last reduced to 3s. 11d. per 1000 cubic feet; the reduction benefiting the Company's consumers to the extent of £190. The amount of the gas-rental had, however, been maintained through an increase (900,000 cubic feet) in the output of gas. The Chairman, in proposing the adoption of the report, stated that the gross profits were £1867, as against £1580 last year; while for nine months in the year the gas had been sold at a lower price. The payment of the suggested dividends would absorb £1315 out of an available balance of £1439, and leave £124 to be carried to the next account. It was intended during the current year to make further alterations and extensions in the washing and purifying plant and in other respects. The report was adopted.

The report presented to the shareholders of the Ilfracombe Gas Company last Wednesday stated that the make of gas in the past year was 40,515,600 cubic feet—an increase of 3,039,600 cubic feet over the production of 1897. A new holder erected at Hele has recently been brought into use, and is working very satisfactorily. The accounts showed an available balance of £1743, after adding £100 to the reserve fund. The report and accounts were adopted, and a dividend of 5 per cent. was declared on both the preference and the ordinary stock.

The half-yearly meeting of the Kingston Gas Company was held on the 23rd ult.—Mr. Philip Jones, J.P., presiding. The report set forth that the statement of accounts for the six months ending Dec. 31, 1898, showed a continued increase in the business of the Company, notwithstanding the extremely mild winter and the advance in the price of coals and labour. The market for residual products had improved. The Directors recommended the payment of the usual dividends upon the shares issued under the Company's Acts. The report was adopted.

The half-yearly meeting of the Lewes Gas Company was held on Wednesday, when the Directors reported that the working of the past six months had resulted in a profit of £1739; and after providing for interest on mortgage, &c., the balance of net revenue was £2676. The Directors recommended that a dividend be declared at the rate of 5 per cent. upon the original capital stock and at the rate of 3½ per cent. upon the additional capital stock, and, in addition, the payment to the holders of the original capital stock of 1 per cent. in part payment of the arrears due to them. After paying these, a balance of £1032 would remain to be carried forward to the next account. The Chairman (Mr. James Broad), in moving the adoption of the report, said the receipts for gas had largely increased; and he could congratulate the shareholders upon the success which had attended the business of the past year. But although the receipts had advanced by something like £400, the expenditure had increased to an almost similar extent. There were times when the expenditure must of necessity be larger than at others; and this was more especially the case during the winter season. They had had to provide new retorts; and other improvements had been made at the works. Still, notwithstanding this fact, they were able to pay the maximum dividend of 10 per cent., and in addition they distributed 1 per cent. in respect of the dividend which was lost to them some time back, when they were not so prosperous. Replying to a shareholder, the Manager (Mr. Levi Monk) stated that when he came to Lewes he was told there were no more consumers to be obtained; but in less than five years, the number had increased by 350, most of whom had slot meters. Those who consumed gas under this system were only charged 4d. more than the ordinary price, and this was equivalent to the meter-rent. The report was adopted; and the proceedings terminated with the usual votes.

The annual meeting of the Londonderry Gas Company was held last Friday—Mr. W. Tillie in the chair. The Secretary and Manager (Mr. John Macnie) having read the notice convening the meeting, the report and accounts, the chief items in which were given in the "JOURNAL" for the 21st ult., were presented. The Chairman, in moving the adoption of the report, and the declaration of a dividend at the rate of 11 per cent. per annum, free of income-tax, remarked that he was sure there was a general feeling of satisfaction among the shareholders that the Company continued in so healthy and progressive a state. Among other matters connected with the Company he might mention that residual products were slightly better last year than previously; and by making the large reduction they had done in the price of gas, a discount of 5 per cent. was given to consumers of £60 and upwards, equivalent to 1 per cent. on the dividend. This was a matter which should not be forgotten. The price of coals was against them during the past year—the advance being equal to about 1s. 6d. per ton; and he feared there was at present no prospect of a reduction. Indeed, it seemed that coal was likely to be dearer during the present year. The next item in the report referred to what most of them felt to be rather an unpleasant subject—namely, the retirement of Mr. Macnie. There was a unanimous feeling of regret among the Directors that this had become necessary; but they had decided to recommend that he should have an annual retiring allowance equal to two-thirds of his salary. They were glad to know that he was willing to continue his services as Secretary at a nominal remuneration as long as he was able; and he (the Chairman) hoped Mr. Macnie would be long spared to give the Company his services in that capacity. Sir William Miller seconded the motion. In doing so, he bore testimony to the admirable manner everything connected with the works had been carried out by Mr. Macnie during his long service with the Company. At the time Mr. Macnie took charge, the dividend was a very small one, if any; and he understood there was no reserve fund at all. They had now a good reserve fund, and for the last three years had been paying a dividend of 11 per cent. on the nominal price of the shares; while for a considerable time previously they had been receiving a dividend of 10 per cent. Along with this, the consumers had been regularly getting a reduction in the price of gas whenever the Directors deemed it proper and consistent with their duty to the shareholders. Mr. Donnell endorsed the remarks of the mover and seconder of the motion; and it was carried unanimously. Mr. Macnie expressed his thanks for all the kind words spoken, and the substantial expression of the shareholders' regard for the manner in which he had, by many years of close application to the interests of the Company, been able to make the business so successful, and to build up a reserve fund which would steady the dividend for long years to come. It was a pleasing thing to reflect that during all these years he had had the full confidence of every member of the Board. He again thanked them, and bade them an official farewell. The retiring Directors and Auditors were then re-elected; and the proceedings closed with the usual votes of thanks.

The annual meeting of the Maldon Gas Company, Limited, was held at the King's Head Hotel, on the 23rd ult.—Mr. W. K. Digby presiding. In their report, the Directors stated that the Company's favourable position had been maintained, although the price of gas had been reduced by an amount of 5d. per 1000 cubic feet. The actual profit for the past year was about £70 less than in 1897, caused chiefly by the use of 100 tons more coal for the manufacture of gas, and the higher cost. The consumption of gas had increased; and the Directors recommended a dividend of 7½ per cent. During the year, £2900 was realized by the sale of gas, and £421 by the sale of residual products; £865 being carried to the net revenue account. At the end of the year there was a balance of £3016. The Chairman moved the adoption of the report and accounts; and the motion was unanimously agreed to.

At the recent annual meeting of the Matlock and District Gas Company, the report presented showed further progress by the Company. The Directors reported having made a profit of £2866 for the year; and this was disposed of by the payment of the usual dividends—absorbing all but a balance of £792, which is carried forward.

The half-yearly meeting of the Mirfield Gas Company was held on the 23rd ult.—Mr. John Tweedale (the Chairman) presiding. Notwithstanding the exceptionally depressed state of trade in the district, there had been an increased demand for gas, especially supplied through prepayment meters; more than £610 having been realized by these alone. By the adoption of regenerative settings, erected by Messrs. Jonas Drake and Son, of Halifax, the cost of manufacture had been reduced; a saving of £296 having been effected thereby. The profit for the half year amounted to £2349, out of which the usual dividend of 10 per cent. on the old shares, and 7 per cent. on the new, was declared. This will require £2325; and the balance will be carried forward. At an extraordinary meeting subsequently held, the Directors were empowered to issue new capital for carrying out, under the supervision of the Manager (Mr. J. W. Turner), further extensions of the works to meet the demand for gas.

At the recent annual meeting of the Neston and Parkgate Gas Company, Limited, a dividend of 4 per cent. was declared; being the largest since the formation of the Company in 1882. A shareholder remarked that the gas-rental had not increased so much last year as in the previous twelve months. The Secretary and Manager (Mr. Alfred E. Ashley) pointed out that the number of consumers had augmented, but that the

extended use of incandescent lighting had kept down the general consumption of gas. The accounts showed a healthy condition; a balance nearly equal to last year's being carried forward, in addition to £50 put aside as a sinking fund for the renewal of retorts. The Manager was presented with a bicycle to assist him in his duties.

The working of the Penryn Gas Company, Limited, in the past year produced a revenue of £959. As the expenditure was £693, the balance was £266. The amount standing to the credit of the profit and loss account is £364, and after deducting the interim dividend, paid in July, amounting to £127, there remains an available balance of £237. The Directors recommend a final dividend of 2½ per cent. (absorbing £159); making a total distribution for the year of 4½ per cent. The balance to be carried forward to the next account will be £77. The Directors refer to their trouble with the Falmouth Board of Guardians in respect to the assessment of the Company's property, which was raised, apparently without any justification, from £75 to £166; and it was found necessary to call in the services of an expert. An appeal was successfully made before the Magistrates, who reduced the assessment to £91 10s., and awarded the Company their costs.

In the statement of accounts issued by the Directors of the Pontypool Gas and Water Company, the profit last year is given as £1793. This is less than it was for the previous year, owing to the increased cost of coal caused by the Welsh coal strike and a reduction of 2d. per 1000 cubic feet in the price charged for gas.

In the report submitted at the meeting of the Sevenoaks Gas Company last Wednesday week, the Directors announced that the consumption of gas showed a satisfactory increase; and the amount derived from the sale of residuals was greater than in the previous year. The gross receipts were £7090, and the expenditure £4934; giving a profit of £2156 for the half year. The amount available for division was £4317; and the Directors recommended a dividend at the rate of 10 per cent. per annum on the original capital, and of 7 per cent. on the additional capital. In moving the adoption of the report, the Chairman (Mr. William Hughes) alluded to improvements which had been carried out in the distribution system for the purpose of giving a better supply to the consumers in the upper district of the town. A large part of this work had been paid for out of revenue, and only a small sum had been charged to capital. They were also on the point of putting fifty incandescent burners in the streets; and this number, he hoped, would be shortly increased. This was being done without extra cost to the public. He also announced that the Directors intended to make a reduction in the price of gas of 1d. per 1000 cubic feet from April 1 next. The report was unanimously adopted.

The annual meeting of the Tonbridge Gas Company was held on Monday, the 27th ult., when the report and accounts for the year ended Dec. 31, 1898, were submitted. The revenue account showed a profit of £2873, and the profit and loss account a balance of £4387; and dividends at the rates of 11½, 8½, and 5 per cent. per annum were recommended—leaving £3225 to be carried forward. The Directors reported that there was a considerable demand for gas cooking and heating appliances; while the prepayment-meter system still proved a very profitable branch of the Company's business. New purifiers had been completed, and would shortly be at work. There had been an increase of 6,256,000 cubic feet, or at the rate of 14 per cent., in the consumption of gas. The Secretary and Manager (Mr. J. Donaldson) reported that the works and plant had been maintained in a satisfactory condition. The Chairman (Mr. John Fagg), in moving the adoption of the report, congratulated the shareholders on the great success of the Company, and said the past year had been a record one. They were able to pay the full statutory dividends; they had charged against revenue a considerable sum for renewal of plant, and had added to the balance brought forward. He referred to the rapid growth of the town, and stated that it was likely to increase at a great rate in the future, as large printing works were being established. The motion was carried unanimously; and the dividends recommended were declared. A hearty vote of thanks was accorded to the Chairman and Directors for their valuable services; and the proceedings terminated with a similar compliment to the Secretary and Manager, for the care and attention he had bestowed on the Company's business. At a previous meeting of the Directors, an increase of £50 per annum was unanimously voted to his salary.

At the recent annual meeting of the Uxbridge and Hillingdon Gas Company, the Chairman (Mr. W. Fassnidge) stated that on the previous occasion he mentioned that lowering the price of gas 4d. in the inner and 6d. in the outer district, to meet the wishes of the shareholders, had not caused the extra consumption of gas, as expected, by the then consumers; but the 2¼ millions extra in the year 1897, as compared with the year 1896, was accounted for entirely by prepayment meters, stoves, and gas used for heating purposes. He was now pleased to say that the Company had supplied still more gas in the past year; the extra consumption in 1898 over 1897 being nearly 7 millions, a portion of which was attributed to the prepayment meters and stoves, while a portion was due to the ordinary consumers. The quantity of gas sold and brought into charge in 1897 was 35,749,400 cubic feet; while for 1898 it was 42,649,200 cubic feet—showing an increase of upwards of 6¾ million (actually 6,899,800) cubic feet. Having dealt with the various items in the accounts, the Chairman said the profit and loss account showed that, after paying debenture interest and property tax, there remained a sum of £2652, which with the surplus profit of previous years gave a sum of £2748 at the disposal of the shareholders. This was sufficient to pay the statutory dividend, amounting to £2583, and leave a balance of £164 to be carried forward. This was looked upon by the Directors as favourable; and he trusted it would be received in the same manner by the shareholders. Mr. Norman seconded the motion, which was carried.

The annual general meeting of the Wellington (Salop) Gas Company was held on the 21st ult.—Mr. Harry Shepard in the chair. The report of the Directors showed the very satisfactory increase of 8¼ per cent. in the consumption of gas, as compared with the previous year; and it was resolved to reduce the price as from Midsummer next to 3s. 9d. per 1000 cubic feet, subject to the usual discount. The Chairman furnished some interesting figures relative to the Company's progress since 1852; these records being the earliest obtainable. In that year the make of gas was only 1,954,000 cubic feet; but from this time a steady increase was recorded up to 1858, when the production was 3,287,000 cubic feet. A further increase brought the make up to 19,743,000 feet in 1880. Ten years later the consumption reached 23,482,000 cubic feet; and for the past year the figures were 30,840,000 cubic feet—being an increase over the previous twelve months of more than 2 million cubic feet. This was partly attributable to the development of the use of prepayment meters, of which there were about 350 at work. Gas stoves and engines also played a considerable part in the increase, and for each there appeared to be a good future. The adoption of incandescent gas-burners for street lighting in 1897 having given such general satisfaction to the inhabitants of the town, a further installation was decided upon by the Urban District Council in 1898, and an extension had been proposed for the present year. In view of the development of the town, extensive alterations at the gas-works were in contemplation. The report was adopted; and the usual dividend was declared.

The Directors of the Wolverhampton Gas Company in their report state that a net profit of £8071 has been secured in the past half year, which, added to the balance from the previous account, amounts to £9654, out of which the Directors recommend the payment of dividends of 3 per cent. upon the preference stock, 5 per cent. upon the consolidated stock, and 3 per cent. upon the new ordinary stock, less income-tax. The completion of extensive additions to the Stafford Road works, mentioned in former reports, has been delayed from various causes, and to the disappointment of the Directors; but, by extensive repairs to the old plant, they have been able to meet all requirements this winter. The whole of the additions contracted for, including enlarged mains in various directions, will be ready for work very shortly. The Directors have exercised the borrowing powers sanctioned at the half-yearly meeting held on Feb. 22, 1898, and have issued at par to the holders of consolidated and new ordinary stocks £34,000 3½ per cent. perpetual debenture stock, the whole of which has been paid. The report was adopted at the meeting of the shareholders last Tuesday.

Speaking at the recent half-yearly meeting of the Worthing Gas Company, the Chairman (Mr. H. H. Gardner) mentioned that it had been decided to increase the illuminating power of the gas by another candle; and although this would mean an addition of about £450 a year to the cost of production, the Directors felt sure the improvement in the light would be appreciated by the consumers. The introduction of the electric light in the town would, no doubt, proceed on prudent lines; and, while it was not likely to affect the Company financially, it was much to be hoped that it would not unduly burden the ratepayers. But even if it should result in some little check to the present rapid growth of the gas undertaking, it would not be without its advantages; and it would also probably secure an improvement in the public lighting, which was sadly needed for the welfare of the town. Though it would hardly be credited, more than half the public lamps were fitted with the same kind of burners as they were forty years ago. The profit and loss account showed a balance of £4333 available for dividend; and of this sum, the dividend and interest absorbed £2315—leaving £2018 to carry forward.

Water Companies.

The half-yearly meeting of the Kettering Water Company was held on Monday last week. A good increase was shown in the revenue for the whole year—the amount having been £6017, as against £5325. To the credit of profit and loss account was a sum of £3791; and, deducting the interim dividend and interest on debentures, a balance of £1941 remained for the payment of a dividend of £8 5s. per cent. per annum on the "A" capital and £5 15s. 6d. per cent. per annum on the "B" capital—making 7½ and 5¼ per cent. respectively for the year. After paying these, the undivided profit would be £238. The report was adopted.

Mr. B. Seebohm, the Chairman, presided at the half-yearly meeting of the Luton Water Company last Thursday. The Directors in their report stated that the balance on the revenue account for the six months ending Dec. 31 was £3206, against £2780 in the corresponding period of 1897. The balance available for distribution was £3144, which admitted of the declaration of the maximum dividend of 4 per cent. and the placing of £974 to the renewal and contingency fund, which now stands at £3785. Water-rates and sales produced £4886, as compared with £4438 in the corresponding period of 1897. The Chairman congratulated the shareholders on having had another profitable half year, and said the new assessment recently made in the town had worked out at so large an increase that it was open to doubt whether the Company could take the gross value as their basis. In many cases, the new assessment was above the rental; and the Directors did not think it worth while to run the risk of stepping outside the Act. They therefore took the revised valuation, and deducted 10 per cent. from it to get the basis of their charges. This concession to the consumers made a difference, as between the actual revenue and what they might have received, of something like £400. Still, owing to the growth of the town and the number of new houses being built, the revenue was bound to increase; and there was no question about the dividends being well secured. The report was adopted.

The accounts presented at the half-yearly meeting of the Maidstone Water Company on the 23rd ult. showed a revenue of £5703, and an expenditure of £3338; leaving £2365 to be carried to the profit and loss account. The amount available for distribution was £1349; and the Directors recommended the payment of a dividend, free of income-tax, for the half year at the rate of £3 11s. 8d. per cent. per annum on the 10 per cent. shares, and £2 10s. per cent. per annum on the 7 per cent. shares. These payments would absorb £801, and leave £548 to be carried forward. In moving the adoption of the report, the Chairman (Mr. G. Marsham) remarked that the extra amount expended on capital account during the past half year was £3316, chiefly made up of £2179 for lands, water-rights, quit-rents, and easements acquired. On the revenue account there was a decrease in the expenditure for the maintenance and repair of service reservoirs, and an increase in the outlay for the maintenance of mains, &c. The dividend recommended worked out at 3s. 7d. on the 10 per cent., and 2s. 6d. on the 7 per cent. shares. The report was adopted; and the dividends recommended were declared.

Mr. W. D. Cruddas, M.P., presided at the annual meeting of the Newcastle and Gateshead Water Company last Tuesday, and, in moving the adoption of the report, said it would be observed that the revenue continued to make satisfactory progress—the increase for the year being 8·34 per cent. But, on the other hand, the increase in the expenditure had been £4169; and a considerable portion of the outlay was incurred in pumping from the Tyne for the trade supply—a precaution which was necessary because of the long and very severe drought of last year. The

maintenance of the filter-beds at Whittle Dene also absorbed money, and there had been a substantial increase in the amounts for rates and taxes and labour. The sum of £47,742 was the balance at the disposal of the Directors; and they recommended that an increase of 10s. per cent. be paid on the ordinary stock. They would then carry over a sum which was somewhat in excess of that brought forward. With regard to the dividends, they were really only paid on less than one-third of the capital of the Company. Since 1876, the whole of the capital had been sold by auction, and the premium formed part of the capital raised, so that the proprietors only received 3 per cent. on their investments. Not more than 5 per cent. had been paid during the fifty years the Company had been in existence. The Chairman also mentioned that satisfactory progress was being made with the new works at Catcleugh. The report was adopted; and dividends at the rates of £9, £6 6s., and £5 per cent. were declared on the three classes of capital. The Directors' fees were increased from £1000 to £1500 per annum; and later a resolution was passed authorizing the subscription, under the provisions of the Redheugh Bridge Act, 1896, of £5000 towards the capital of the Bridge Company

At the recent meeting of the Trowbridge Water Company, the Manager (Mr. W. W. Gray) reported that up to the end of the past year the total number of premises supplied was 2649, of which 217 were on the meter system. The Directors recommended a dividend of 4½ per cent. per annum, after payment of which there would be a balance of £133.

The shareholders of the Whitby Water Company last Tuesday declared, from a balance of £1773 on the half-yearly revenue account, dividends at the rate of 8 per cent. per annum on the original shares and £5 12s. per cent. on the new shares. After paying these, a sum of £677 will remain.

At the meeting of the Woking Water Company last Tuesday, Mr. R. Hesketh Jones, J.P. (who occupied the chair in the absence, through indisposition, of Mr. Charles Horsley, J. P.), replied at some length to the attacks which have recently been made upon the Company. He said that the present Company was formed in 1881; and in their early days they had many difficulties to contend with. The first dividend was paid in 1884, and was at the rate of 1 per cent. By 1892 this had been increased to 4 per cent., which figure had been maintained up to the present time. It would be seen from the report that the additional expense involved in maintaining a supply of water during the famine of last summer was £632; while the revenue from water only increased by £208. Of course, they much regretted the abnormal conditions which had prevailed; but they had at least the satisfaction of knowing that no pains had been spared by the Company in the endeavour to fulfil their obligations to the consumers. He trusted that the efforts of the Company to provide additional sources of supply would not meet with the opposition with which they were now threatened. The Directors had experienced great disappointment in this respect; but they were determined not to relax their efforts until an adequate supply was forthcoming. During the past five years the revenue of the Company had increased by nearly 50 per cent. Mr. C. E. Jones, in moving the declaration of a dividend at the rate of 4 per cent. per annum, said the Company had done their duty well. The small return which the shareholders received for embarking their capital in the undertaking, should entitle the Company to the support of the district.

AUSTRALIAN GASLIGHT COMPANY.

The Half-Yearly Meeting of this Company was held in Sydney, New South Wales, on Jan. 30—Mr. George J. Cohen presiding.

The Secretary (Mr. R. J. Lukey) having read the notice convening the meeting, the report of the Directors, with the statement of accounts for the six months ending Dec. 31, was taken as read. The former showed that the profits amounted, with the balance brought forward, to £57,580; and the Directors recommended the payment of a dividend for the past half year of 9s. per share, free of income-tax. This would absorb £51,135, and leave a balance of £6445. The demand for prepayment meters continues; upwards of 2000 being in use in Balmain, Leichhandt, Annandale, and Camperdown. When the requirements of these places are fully met, the system is to be extended to other suburbs. The price of gas to ordinary consumers was reduced on the 1st of January to 4s. per 1000 cubic feet, and for public lighting to 5s. and 10s. per lamp per annum for ordinary and 80-candle power lights respectively. This is the fifth reduction made by the Company in the course of six years.

The Chairman, in moving the adoption of the report, expressed the pleasure he felt at meeting the shareholders with so favourable an account. The stock of coal was larger than usual, in consequence of the unsettled state of affairs in Newcastle; and the Company had in hand three months' supply in case of a strike. The "penny-in-the-slot" meters were very popular with the class of consumers for which they were intended. The Company were fitting up houses and supplying these meters at the rate of 150 per month; and the demand was steadily increasing. The extension of the Company's mains to North Sydney would involve an outlay of about £30,000; but a good return was anticipated, as large houses were being erected very fast throughout the district. When this extension was completed, the area embraced by the Company's mains would not be less than 400 square miles. The price of gas was now 4s. per 1000 cubic feet. The policy of the Company to reduce it whenever practicable had been a good one; for though the last five reductions had benefited the consumers to the extent of £90,000, the usual dividends had been paid to the shareholders, and the undertaking was as strong financially to-day as ever it was. The utmost care had been exercised in keeping the plant in good working order. The Board, deeming it advisable that the Engineer (Mr. T. J. Bush) should personally inspect the many alterations and improvements now taking place in the gas-works in London and elsewhere, had arranged for him to visit England; and he would leave for England at the close of the meeting. The Board felt assured that great advantage would accrue to the Company as the result of the Engineer's investigations. In conclusion, he stated that the consumers had increased in number during the past half year to 37,236; the public lamps were now 10,090; the gas-cookers in use, 8511; and the mains and services laid, equal to 1250 miles.

Mr. J. H. Storey seconded the motion; and it was adopted.

A unanimous and enthusiastic vote of thanks was accorded to the Chairman, Directors, and officers, for their efficient management of the Company's affairs.

GAS AND ELECTRIC LIGHTING AFFAIRS IN BELFAST.

Gas Workers' Pay—The Recent Explosions.

At the last Monthly Meeting of the Belfast Corporation, the minutes presented by the Gas Committee contained a report from the Engineer (Mr. J. Stelfox) to the effect that he had ascertained that the wages earned by the coalmen engaged at the works averaged £1 18s. 1d. per man per week during the year—the minimum being £1 0s. 2½d. and the maximum £3 5s. 11d. per week; and the Committee saw no reason to make any change. He also reported that the labourers worked 58½ hours a week, and that some of them also had to work on Sundays. The Committee recommended that the labourers' time be reduced to 54 hours a week, and that such as were required on Sundays should be paid for the hours between 6 a.m. and 10 p.m. at the rate of time-and-a-quarter. As some of the stokers had also to work on Sundays, the Committee resolved that they should be paid at the rate of time-and-a-quarter between the hours of 6 a.m. and 10 p.m.; further, that as it was desirable to lessen Sunday labour so far as practicable, and it was expected that the foregoing resolutions would have this effect, the occasion for granting holidays would not be required, and therefore the arrangements for them previously sanctioned should be withdrawn. The adoption of the minutes having been moved and seconded, Mr. Bowman submitted an amendment to omit the words "for the hours between 6 a.m. and 10 p.m." from the recommendation in regard to labourers' wages; and this was carried by 16 votes to 12.

At the same meeting, reference was made to the recent explosions in electric light culverts. Mr. Andrews, in moving the adoption of the minutes of the Electric Lighting Committee, said the chief cause of the two explosions which had lately occurred was a defective gas-main nearly opposite the Theatre Royal. Tests made near this main revealed as much as 25 per cent. of coal or coal and water gas mixed with 75 per cent. of air. The old main had been replaced; and since then they had not discovered any escape. It had been suggested there should be some system of ventilation of the culverts; and this matter was under the consideration of the Committee. Mr. Young said it was exceedingly improper to put the blame for the explosions upon the Gas Committee. Immediately after the explosion in Ann Street, the gas-mains were carefully examined; and no escape whatever could be detected. The cause of that explosion, if Mr. Andrews would only admit it, was the cables for the electric current not being properly laid. Instead of being laid as they were now in metal pipes, they nakedly rested in a little trestle in an open drain. Mr. Barklie said Mr. Stelfox had denied in the most emphatic manner that the explosions were caused by an escape of coal gas; and he (Mr. Barklie) had been unable to find any such escape. Before the explosion took place, a merchant in Ann Street noticed a smell which he described as that of sewer gas. He (the speaker) would like to know what scientific evidence Mr. Andrews had for saying that this gas contained 25 per cent. of coal gas and 75 per cent. of atmospheric air. Replying on the discussion, Mr. Andrews said he asked the inspector of mains whether he could in any way account for the explosion, because it seemed, from a scientific point of view, impossible to make an explosion of electricity itself spread so far. It was, of course, quite possible that an electric spark might have exploded a quantity of gas collected in a conduit. The second explosion was undoubtedly caused by the use of a flame by one of the Corporation employees, who was making a joint. Subsequent investigation showed that there were certain neighbouring boxes highly impregnated with coal gas, which was present in the proportion of 25 per cent. The question was: Where did this gas come from? All these boxes were connected with the pipes in Ann Street, so that the impure air or gas mixture might go along any where in the vicinity. It was found that there was more gas in the boxes just opposite the Theatre than anywhere else in that district. The explosion clearly occurred from the old main. No fault attached to the Gas Committee, and he had not attempted to throw any blame upon them; but it was nonsense to suggest that the explosion could have occurred through electricity alone. Their business would be to test the boxes, and see if there were escapes of gas; and, if there were, to assist the Gas Committee in stopping them. The minutes were then confirmed.

LEEDS GAS AND WATER PROFITS AND THE RATES.

At a Special Meeting of the Leeds City Council last Wednesday, the following motion, which had been placed on the *agenda* by Mr. Wilson, was discussed: "That it be an instruction to the City Accountant to apply the profits of the water-works, gas, and tramways undertakings, not already appropriated to reserve or depreciation accounts to the city fund, as provided by the respective Acts of Parliament under which the said undertakings are set up or carried on."

Mr. Wilson, in proposing the adoption of his resolution, pointed out that, at the end of the last financial year, there was a deficiency on rating account of £35,000, and also an old deficit of £14,166, which had been placed on the consolidated rate account under the title of suspense account. Roughly speaking, therefore, there was a deficiency in connection with the rating account of about £50,000. On the other hand, there was a surplus (exclusive of the present year's profits) of £22,258 in the hands of the Gas Committee, £14,794 on water-works account, and £10,324 on tramways; all these sums being profits which had not been paid into the city fund, as was required by the various Acts of Parliament under which these undertakings were carried on. He noticed that the Gas Committee preferred that £10,000 should be put to the depreciation account, which was authorized with the consent of the Council by the Leeds Improvement Act of 1887, and that the Water Committee would like to annex the whole of their profits to a similar fund. He argued that it was not necessary to put either of these sums to depreciation account. It was quite enough to pay interest on borrowed moneys, and provide a sinking fund, without putting a further burden on the top of this in the shape of a depreciation fund. The only argument that could be advanced in favour of a depreciation account was that there might suddenly come a catastrophe which would upset the rating proposals of any one year. Such a contingency, however, was very remote; and the

current year's profit would always be available. Having instanced various corporations which had applied profits to the relief of the rates, Mr. Wilson pointed out that the Act of Parliament specifically stated that the profits "shall" (not "may") be paid to the credit of the city fund. The only exception was in the Leeds Improvement Act of 1877, which stated that the Corporation might, if they thought fit, apply some sum out of the profits of any one year to a depreciation account. But these sums could never be brought back from the fund in relief of the rates; and it was well that the Council should not allow too great a sum to go to the fund. According to the Act of Parliament, the fund was never to exceed one-twentieth of the capital expenditure.

Alderman C. F. Tetley seconded the proposition.

The Lord Mayor (Alderman Harding) called attention to the fact that Alderman Lowden had given notice of a resolution, which he suggested might be taken as an amendment.

This suggestion was agreed to, and

Alderman Lowden thereupon proposed, as an amendment, an addition to the effect that the Gas Committee should be empowered to apply £10,000 from their surplus to a depreciation fund, and that the Water Committee should be authorized to apply £7000 of their profits to a similar fund. In support of his amendment Alderman Lowden pointed out that Mr. Wilson's resolution was unnecessary, because it had already been declared by Act of Parliament that profits should be paid automatically into the city fund. From the passing of the Act in 1870 to 1877, all profits were paid into the city fund, amounting to £37,840, and in the year 1874 £5516 was paid out of the fund in relief of rates. By the Act of 1877, the Council obtained additional powers to provide depreciation funds in connection with the Gas and Water Departments, and to pay into these funds only such sums as the Council might think fit from the preceding year's profits. In 1878 a resolution was passed forming "a gas-works depreciation fund;" and all the profits of the previous year were paid into it. From that year to 1884, the Gas Committee appropriated the whole of the profits of the department. In the latter year, however, a grant was made by the Council to the city fund of £10,000. From 1884 to 1895 inclusive, there was no need of a depreciation fund, because the net loss during that period amounted to £43,232. From 1895 to 1898 inclusive, the profits of the Gas Committee were £79,576; and therefore there was need of such a fund. Of all the Corporation departments, the Gas Department was in greatest need of such a fund, owing to the revenue being subjected to fluctuations in a greater degree, by reason of the variation in the cost of coal and the income from residuals. The depreciation fund would enable the Committee to avoid fluctuations in the price of gas. Moreover, the existence of such a fund would obviate the necessity of applying to the Local Government Board for borrowing powers for carrying out any minor improvements, and would enable the Committee to meet any disaster or unexpected loss without the department being a burden upon the rates. The present proposal was a very moderate one. The profits of the gas undertaking last year were £12,232, and they now only asked for £10,000 for the depreciation fund; they were not empowered to ask for a grant out of previous years' profits. It would be found that for the current year, which ended on March 25, there was a substantial profit; and it was his intention, with the consent of his Committee, to ask the Council for a further grant.

Mr. Denison, who seconded the amendment, mentioned that the present balance to the credit of the water-works account was a little over £14,000; whereas the total amount of profits paid into the city fund from the time the water-works were purchased up to March, 1898, was £141,695.

Mr. Kinder objected to the system of transferring profits in relief of rates, contending that "every tub should stand on its own bottom."

After further discussion, the amendment was carried by a substantial majority.

THE GAS, WATER, AND ELECTRICITY SUPPLY UNDERTAKINGS OF THE LANCASTER CORPORATION.

At the last Monthly Meeting of the Lancaster Corporation, the satisfactory position of the gas, water, and electricity undertakings was brought out in connection with the presentation of the minutes of the respective Committees having charge of them.

Taking the Gas Department first, Mr. Bowness stated that there had been a reduction in the consumption of gas through ordinary meters of 259,100 cubic feet; but this had been more than counterbalanced by an increase of 2,271,945 cubic feet through prepayment meters, and there had also been an increase of 227,111 cubic feet in the consumption by public lamps. The decrease in income from ordinary meters had been £44; but there was an additional revenue from prepayment meters of £379. There had also been a decreased income of £59 from the public lamps. The falling off in the receipts from ordinary meters was due to the adoption of electricity for many of the shops and public buildings, and also for private houses; and the diminished income from the public lamps, though there had been a greater consumption, was due to the fact that the Committee had reduced the charge from 2s. to 1s. 9d. per 1000 cubic feet. This, of course, was with the view of enabling the Lighting Committee to increase the number of lamps in different parts of the town where they might consider it to be necessary. When prepayment meters were first introduced, one was placed on the Corn Exchange in the Market, so that the stall-holders and others might experiment as to the amount of gas that could be obtained for a penny. From that moment the meter "took on;" and it had been growing in favour ever since. He was pleased to make this announcement, because it justified the action the Committee took in the face of some slight opposition at the time. The amount they estimated to be able to hand over to the borough fund on the 31st of March was £1880; while they reckoned that next year they would be able to place £1250 thereto. Of course, these figures were merely estimates; they could never give the exact amount, because they could not govern the price of residuals in the market. There had been an increase on the estimate, due to additional consumption of gas, and also to improvement in the price of residual products. The expenditure had been less, and the whole undertaking was in an efficient and prosperous state, reflecting great credit upon the Gas Engineer, Mr. Charles Armitage.

The minutes presented by the Electricity Committee contained the announcement that the Committee had resolved to reduce, as from the March quarter, the price of electric current from 4d. to 3d. per unit for motor purposes, and from 5d. to 4½d. per unit for private lighting. Mr. Hall, in moving the confirmation of the minutes, said the Electricity Department had had a very successful year, and the Committee thought the proper thing to do was, at the earliest possible opportunity, to give the consumers the benefit of the excellent financial condition of the undertaking. It had, therefore, been decided to reduce the price of current both for motive power and for lighting purposes. This would make a considerable difference in the income and profit another year; but they thought that by lowering the price they would greatly increase the output. Seeing they were in a position to do so, it was only right that those who had helped forward the undertaking should get the benefit of it.

In moving the adoption of the minutes of the proceedings of the Water Committee, Alderman Kitchen pointed out that the income, which was estimated at £14,627, had actually amounted to £16,919—an increase of £2291; and there was a decrease of from £500 to £600 in the expenditure. The estimate was £12,085, and the actual amount laid out had been £11,668. They had anticipated that at the end of March they would be able to hand over to the borough fund £2541; but as the result of the year's working they would actually be able to place thereto £5251, which he thought was a very large amount. In the coming year they did not estimate that the balance would be so large, but they had put it down at £2673, and he had no doubt this sum would be forthcoming. The Vice-Chancellor of the Duchy had given his decision in regard to the Wyre litigation; and unfortunately, as they thought, had charged the Corporation with the whole of the costs.

The Chairman of the Finance Committee (Alderman Smith) referred to the three above-named undertakings when presenting his estimates for the coming year. Though the total indebtedness of the town was £425,107, which worked out to considerably more than £10 per head of the population, a large proportion of it—£329,722—had, he said, been expended on productive or remunerative works, such as the water, gas, electricity, and markets undertakings. The remainder—£95,385—was for unproductive works, such as the Town Hall, the sewerage, &c. If it were sought to convert the productive works into a limited liability company, he did not think they would have any difficulty in floating them on a 4 per cent. basis, seeing that the security was unimpeachable—indeed, he did not think, in the present condition of the Money Market, there would be any difficulty in getting the works floated on a 3 per cent. basis. If the water, gas, and electricity works were put on the market—and that was the real way of ascertaining their value to the community—on a 4 per cent. basis, they would realize £600,000; if on a 3 per cent. basis, £800,000. Therefore the community need not distress itself at all as to the question of the capital debt being so large.

SMETHWICK GAS SUPPLY.

The Annual Accounts of the Gas Department.

The report and accounts for the year ended Dec. 31, 1898, in connection with the Gas Department of the Smethwick District Council have just been issued by the Secretary (Mr. W. J. Sturges). The report states that the loan indebtedness was reduced during the year by £674; and that the total debt at the close was £159,296. The expenditure on capital account during the twelve months amounted to £6050—viz., for the new retort-house in course of construction, £4171; for new mains, £857; for new meters, £1021. The total expenditure was £177,562; exceeding by £8160 the amount authorized to be borrowed. The income from the sale of gas again shows a highly satisfactory increase; the receipts from this source being £1693 in excess of those for 1897. The quantity of gas sold was 14,602,100 cubic feet, or 6·8 per cent., more than in the previous year. The number of meters in use on Dec. 31 was 3538—an increase of 420; 227 being of the prepayment class. The aggregate number of these meters now in use is 800. There was considerable improvement in the income derived from residual products. Coke yielded £1014 more, arising from the greater output and a rise of about 6d. per ton in the average selling price. Tar produced £215 more than in 1897, and ammoniacal liquor £124 more, chiefly due to improved prices. The total income from residuals was £7731, compared with £6377, or an increase of £1354. The usual analysis of working shows an increased yield of coke per ton of coal carbonized—representing on the total tonnage of coal a sum of about £260; but against this there was a diminished yield of tar and ammoniacal liquor of about £200. The total income from all sources was £35,433, against £32,309—an increase of £3124. The aggregate amount expended on the year's trading was £23,725, or £2440 more than in the preceding year. The expenditure on gas manufacture was £19,002—an increase of £1776. Coal and oil cost £13,801—an increase of £1334, due to the quantity being 2600 tons greater than in the previous year. The average price of coal and oil was 11s. 10·47d.; as compared with 12s. 0·895d. in 1897. There was a slight decrease in the cost of purification; and there was a saving in wages amounting to nearly 1d. per ton of coal carbonized. Repairs and maintenance of works cost slightly more last year than in the preceding twelve months. The total cost of distributing gas was £1859, compared with £1354—an increase of £505. This includes £400 for re-arrangement of mains. The lighting and maintenance of public lamps shows an increase of £125; the total number of lamps now in use being 927—an increase of 26 during the year. The gross profit was £11,707, compared with £11,024 for 1897—an increase of £683—this representing a return of 7 per cent. on the amount of capital employed. After making provision for the usual payments for interest, &c., there remains a net profit for the year of £3979—an increase of £941 over the previous year. This will enable the Committee to contribute £2000 in relief of the district rate.

Bridlington Water-Works Purchase.—The minutes submitted by the Water Committee at the meeting of the Bridlington District Council last Tuesday showed that at length a movement was being made, in the matter of the water-works purchase, to raise the money to meet the recent arbitration award, amounting in itself to £66,260, and with expenses and pensions to above £70,000. The purchase was to take place on or before Feb. 12, after which date the Council would be called upon to pay interest at the rate of 5 per cent. The new Chairman of the Committee (Mr. G. G. O. Sutcliffe) and the Clerk to the Council, had been instructed to take steps for borrowing the amount required.

IMPROVED PUBLIC LIGHTING FOR CHELSEA.

The Surveyor to the Chelsea Vestry (Mr. T. W. E. Higgens) has presented to the Lighting Committee a report setting forth a scheme for the improved lighting of the parish. He thinks that a commencement should be made in the more important streets, and that a sum of £1000 or £1200 might be included in this year's estimate; the greater portion of which should be expended in improving the lighting of the main roads, the balance being spent on a small number of new lamps, all of which are, he says, urgently required in various dark spots in the parish. The first step towards improving the lighting is by increasing the light given by the existing lamps in the main roads. There are at present some 237 lamps which, he thinks, should have their lighting power increased. In these lamps he suggests fixing Welsbach patent lanterns, each with a No. 4 burner, governor, and anti-vibrator complete, in accordance with an estimate submitted. But when these new lanterns are fixed, it will be necessary to set back 150 of the lamp-posts inside the kerb. The new burners would consume about 4½ cubic feet of gas instead of the 4 feet now used; and the maintenance of the mantles, &c., would be an additional cost over the present system. He estimates the total capital expenditure at £713, and the annual expenditure at £230—together, £943. He allows for 46 new lamps, of which 16 could, he says, be placed in the main streets. They would be provided with lanterns and Welsbach burners similar to those mentioned in his former estimate; but the remaining 30 would be the ordinary street-lamps now in use in Chelsea. He estimates the capital expenditure in providing and fixing the new lamps at £157; and the annual expenditure at £138—together, £295. The total expenditure to be incurred will therefore be as follows: Capital, £870; annual, £368—together, £1238. Mr. Higgens is not prepared to admit that the expenditure on new lamps is at all adequate to the Chelsea requirements; but as the alterations to the existing lamps will probably take some time to complete, a sum of £1200 included in this year's estimates will be sufficient to initiate a much-needed improvement in the lighting of the parish, which can be followed up in subsequent years by the provision of new lamps as it is found desirable.

THE PROPOSED PURCHASE OF ASHBURTON GAS-WORKS BY THE DISTRICT COUNCIL.

An inquiry was held at Ashburton last Saturday week, by Mr. H. P. Boulnois, one of the Inspectors of the Local Government Board, respecting an application by the Urban District Council for a Provisional Order authorizing them to purchase, improve, and enlarge the undertaking of the Ashburton Gas Company.

Mr. R. E. Tucker, the Clerk of the Council, appeared to support the application; Mr. E. Windeatt, solicitor, represented the Company.

The application was opposed by Mr. Millman, a ratepayer, on the ground that the amount to be given for the undertaking was too large, that the works were in a dilapidated condition, and that the proposed purchase was contrary to the wish of the general body of ratepayers. A member of the District Council (Mr. Michelmore) was also opposed to the application unless a clause was inserted in the Provisional Order giving the Council power to lease the works.

Mr. Tucker stated that the price at present charged for gas was 5s. 5d. per 1000 cubic feet. As the result of an application by the District Council, the Company offered in June last to sell their undertaking for £2500—the Council bearing the cost of the transfer, and paying the Company in addition for the stock in hand at the date of the transfer. Subsequently the Council engaged Mr. H. A. Willey, of Exeter, to value the property; and on his advice they agreed to purchase on the Company's terms. Application was made to the Local Government Board for power to borrow £3400 for the purchase and the necessary repairs to the works; and it was then found that they must proceed by means of a Provisional Order. The Company was formed in 1839, and had an authorized capital of £1500, of which £1480 was paid up. Since its formation, the Company had spent £1000 out of revenue in extensions and improvements. The site of the works was held on lease for 1000 years from 1839, at a ground rent of £2 10s. per annum; and there was also a piece of freehold land on which a coal-store had been built. The works had been leased for many years at a rental of £125 per annum; but the lease expired at Midsummer last. The Council were the largest customers for gas; and one of the objects of acquiring the undertaking was to improve the public lighting.

Mr. *Henry A. Willey* said he estimated that it would cost £840 to put the works in thorough repair. The make of gas now approximated 2 million cubic feet per annum; and his opinion was that if the plant was improved, and opportunity afforded the working classes of using gas by means of prepayment meters, the consumption would greatly increase in the hands of the Council. By acquiring an orchard adjacent to the works, the Council would have space for future extensions. He estimated the revenue of the undertaking at £647, and the profit at £300, which, after paying interest and sinking fund, would enable the Council to reduce the price by 5d. per 1000 cubic feet, and leave £100 a year towards the reduction of the rates. He was prepared himself to take a lease of the works at a rental of £200, and thought the Council were to be congratulated on the opportunity of buying the undertaking at the price agreed upon.

In answer to Mr. Windeatt, witness said the amount to be paid to the Company inadequately represented the value of the undertaking.

Mr. Millman said Mr. Willey's statement had very largely disarmed his opposition, though he still thought the sum to be paid for the works was excessive.

Major *Tucker*, Chairman of the Finance Committee of the Council, explained, in answer to Mr. Michelmore's objection, that the Council had no desire to lease the works, because the rental they would get would not be sufficient to pay the interest and sinking fund of the loan, and the purchase would therefore be of no advantage to the town.

Mr. Windeatt said that the Company, after agreeing to sell to the town for £2500, consulted an expert, who valued the works as a going concern at £3000. The Company was originally formed for the purpose of introducing gas into the town rather than with the object of making profit for the shareholders; and it was for this reason that the Company were willing to sell the property to the Council for less than the market value.

Mr. *S. Samuel*, Manager of the Totnes Gas-Works, estimated the value of the works at £3000, and said it would cost about £900 to execute the necessary repairs and renewals. He was positive that the undertaking could be worked at a profit to the ratepayers, and thought it very probable that the price of gas might be reduced.

This concluded the evidence; and the Inspector visited the works.

CITY IMPROVEMENTS IN LEEDS.

By an Occasional Correspondent.

The principal towns in the Provinces have great need of improvement, alike in respect of lighting, sanitation, and locomotion. But the Leeds Corporation have thrown themselves into the thick of it; and many new buildings have been erected on the sites of slums and rookeries. The particular phase of progress in the city is the development and multiplication of arcades. The housing of the poor is a gigantic problem which has yet to be faced; and special attention should be directed to granting thrifty housewives a little more drying-space than that obtained between door and door in the main street. The poor in the East-end of London have their model dwellings and drying-space on the roof, which is preferable to the practice forced upon the wives of mechanics in Leeds.

Being in the city recently, I paid my respects to "the powers that be" in the handsome Municipal Buildings, and found the City Engineer and his staff fully employed. The Corporation are extending their electricity works and increasing the plant by putting down four Lancashire boilers, two new engines, and two dynamos. Owing to the extension of the electric tramways, the Engineer is arranging for increased boiler accommodation, and for the erection of two new engines of 1300-horse power. In Leeds the Corporation have a large number of works in different parts of the city; and they have just let contracts for the remainder of eight stations, at a cost of about £3000. The Council have instructed the Engineer to prepare a large cartoon showing the present accommodation in the town, in conformity with the scheme proposed by a member of the Council (Mr. Beaumont) for providing Leeds with more electric cars. Indeed, it is proposed to embrace the whole of the city in one electric system. Of course, the two generating stations will be entirely separate—one reserved for town lighting, and the other for private lighting; while the car stations will be at different points. A few days ago the Corporation had just lighted the Judges' Chambers with a perfect installation in every room.

In the Gas Department there has been a wave of prosperity. There is an increase of 5 per cent. in the consumption of gas, notwithstanding the electric light; and what is still more wonderful is the extraordinary increase of 12 per cent. in the manufacture. The greater part of the mains have been in use for fully thirty years. The development of the city has been so great that the Council contemplate overhauling all the distributing plant, and laying new trunk mains of greater capacity—for instance, 4-inch pipes will be replaced by 12-inch. The Council intend to expend about £100,000 during the next five years in the extension and alteration of the mains. As a matter of fact, they laid from April to December of last year 21 miles of new mains; the diameters being 6, 8, 10, 14, 24, and 36 inches. The Engineer and Council are confident that these extensions and additions, with sound mains, will greatly reduce the leakage account, and also lead to an increase in the sale of gas.

At present the gas consumers in Leeds and the suburbs are very much scattered; and when the pressure is high in the valley it is poor in high-lying districts. But it is proposed to rearrange the governors at the works so that they can equalize the pressure in both high and low districts. Hence these governors are expected to effect a great saving. The Leeds Gas-Works have the largest area to supply outside London. The Gas Committee have more miles of main to lay; and in straggling districts this is apparent, as there are very few consumers. The new house furnished with inclined retorts at the Meadow Lane works has given complete satisfaction; and it will not be long before some retort-houses at the other works will be fitted up on the same system. During the winter months, the Council could have sold some 2 million cubic feet more gas; but the mains could not take it, or what they did take they lost by leakage. The Committee are now alive to the situation, and intend to improve their works so as to make them the best in the country. The weakness is the distributing plant; but this will soon be rectified. One cause of leakage may easily be accounted for. Though the city is lighted by electricity, public gas-lamps still remain, with large meters inside them, for which no rent is charged. These lamps are utilized when the electric light fails, as it sometimes does. Then the lamps are lighted, and gas is, of course, consumed; but the Public Lighting Department is a low unit itself, as it renders no account to the Gas Office. One would fancy a city so well regulated otherwise would permit the Gas Engineer to control his department up to the point of consumption even by the Public Lighting Department. At any rate, that was how I looked at the matter in my wanderings about the city.

Returning to the City Engineer, I may just mention that he is also carrying on experiments at the Knostrop sewage works on the bacteria principle. The Corporation are about to construct septic tanks, so as to give that plan a trial. The city has long had a sewage irrigation farm near Rodley, on which the waste of Leeds is placed. The farm covers 65 acres; and the Department have been busy putting in drains and earthenware conduits. The new dead meat market is an excellent building, and was very much wanted. It cost £30,000, exclusive of the value of the site. The new buildings are 214 feet long and 195 feet wide. The ironwork was supplied by Mr. W. Horsfal; the boilers, by Messrs. Clayton, Son, and Co., Limited; the wrought ironwork, by Messrs. Thomasson and Co., of Manchester; the engineering and plumbing for the water supply, by Messrs. H. Braithwaite and Co.; and the overhead gearing, by Messrs. Lockerbie and Wilkinson, of Birmingham. Up to the present, the Corporation have spent upwards of £100,000 in purchasing central property for the improvement of this important city of woollens and worsteds.

MESSRS. FLETCHER, RUSSELL, AND CO.'S NEW WORKS AT WARRINGTON.

Visit of Shareholders.

The formal opening of the new works of Messrs. Fletcher, Russell, and Co., Limited, at Warrington, of which a report appeared in the "JOURNAL" for the 21st ult., was followed last Thursday by an invitation to the shareholders, debenture-holders, and a number of friends, to a general inspection of the extensive establishment erected at Wilderspool.

The proceedings were opened by a special meeting of the ordinary shareholders, at which Mr. W. Russell, who presided, presented a short report, in the course of which he stated that the primary reason for calling the meeting was that, inasmuch as the term of office of the four ordinary Directors expired on the 28th ult., it was necessary that they should be re-appointed or otherwise. The Directors, in calling the meeting, had thought it advisable that it should be held at the new works; thereby giving the shareholders and friends an opportunity of inspecting them, and allowing them to see that the work had been carried on as rapidly as possible. Owing to the transmission of some portion of the business from Pendleton to the new works, the Directors had thought it advisable that the meeting should appoint the Managing-Directors for a further period of one year from the expiration of their present term —March 1, 1900. The agreements with the junior Directors as Departmental Managers would expire on April 13, 1899; and fresh agreements would be entered into at the expiration thereof.

The recommendations contained in the report having been unanimously adopted, the shareholders and guests were invited to a light luncheon which had been prepared in the large show-room of the new buildings, and upwards of 200 sat down. Mr. Thomas Fletcher occupied the chair; and among those present were the Mayor of Warrington and Messrs. W. Russell, A. C. Russell, C. Clare, E. L. Fletcher, W. R. Neil, and other of the principal representatives of the Company. After luncheon, a short toast-list was gone through; and Mr. William Russell, in a few introductory remarks, referring to the re-appointment of the Managing-Directors, said it was possible some reconstruction of the Board might take place in the near future; but they were anxious that it should not be carried out until they had more completely developed the extension of their undertaking. They had asked the shareholders to come and visit the works before they went much further, as they did not believe in people putting their money into deep holes, the bottom of which they did not know. He might remark, as a word of warning to the gas companies, that if, in consequence of the rise in the price of iron and metals, necessitating a corresponding increase in the price of their manufactured materials, they threatened to cut off their accounts, which had already been done in one or two instances, it should be borne in mind that the gas industry was not the only one of the twentieth century. Already Messrs. Fletcher, Russell, and Co. manufactured electrical heating and cooking apparatus; and they were in a position to carry out a great deal of work independent altogether of gas appliances. Personally, he might say he was friendly to the companies; but he had felt rather hurt by certain things he had heard recently. He thought the gas companies should support Messrs. Fletcher, Russell, and Co. in their efforts to develop the use of gas by the various appliances they manufactured.

The toast of "Success to the Company" was proposed by Mr. J. Forshaw. He coupled with it the name of Mr. William Russell, who briefly responded. Mr. A. C. Russell proposed "The Town and Trade of Warrington," which was responded to by the Mayor. "The Health of the Visitors," with which were coupled the names of Mr. E. Guthrie and Mr. H. Morley, Engineer of the Cardiff Gas Company, and "The Press" having been proposed and responded to, this portion of the proceedings was brought to a close. The shareholders and visitors were afterwards conducted through the various portions of the works; and a special casting was made in their presence.

We have already pretty fully described the general arrangement of the new works, which have been built from the designs of Mr. A. Neil; but a few retrospective particulars in the form of a connecting-link between the past and the future history of the Company may be of interest. The Company was formed and incorporated on Feb. 16, 1892, and purchased the amalgamated businesses of Messrs. T. Fletcher and Co., Warrington and London, and Messrs. W. & A. C. Russell and Co., of Pendleton, Manchester, and London. The former was founded in January, 1872, by Mr. Thomas Fletcher; Mr. Alfred Clare becoming in later years a partner; and the latter at Pendleton, in January, 1876, by Messrs. W. & A. C. Russell, who had had many years' previous experience in similar businesses in Scotland—Mr. Alexander Neil becoming a partner in April, 1881. On April 12, 1897, a fresh election of Directors took place. Four Vendor Directors again became Managing-Directors, and four new ordinary Directors were appointed to assist and relieve their senior colleagues, who also appointed them Managers of Departments. Fresh agreements were entered into; and the full energies of the new Board have since been devoted to the Company, and also to the establishment of the new works and the consolidation of the business. During the last two years, under this combined Board, the business has been carried on with success. The efforts of the Directors have also been earnestly directed to the early establishment of the new central works, with the result that, though not yet complete, they have, as previously reported, commenced operations; the first castings being successfully made on the 15th ult. The erection of these new works has been carried out, in the first place, to centralize the workshops and administration of the business; secondly, to provide more accommodation for the past increase in trade and for future extensions; thirdly, to save carriage and trading expenses between departmental works; and, fourthly, to prepare for general economies to meet growing competition. The former works, in Thynne Street, Warrington, are now closed, and are offered for sale. The present new buildings are designed to form a specific portion only of the complete works; but they will meanwhile be used for general purposes. The dimensions of the various sections are approximately as follows: Front administrative office building, with three floors, 127 feet long by 62 feet wide; warehouse and despatch building, five floors, 124 feet long by 78 feet wide; fitting and tinsmith's building, three floors, 172 feet long by 78 feet wide; mouldings and castings department, one floor, 182 feet long by 172 feet wide; grinding and testing, &c., building, one floor, 114 feet long by 67 feet wide. In addition, there are numerous other buildings, including the engine-house, which contains a compound tandem engine, indicating about 130-horse power; and the general plan gives every facility for the economical and quick transmission of the castings to the various departments.

COMPLETION OF THE NEW CONVEYOR COMPANY'S WORKS AT SMETHWICK.

The completion of the new Conveyor Company's duplicate workshops at Smethwick was made the subject of an interesting ceremony yesterday, when nearly a hundred members of the Birmingham Association of Mechanical Engineers, about forty employers of labour from the Black Country district, and upwards of a dozen gas engineers, inspected the premises and the numerous new tools installed therein to meet the daily increasing demand on the Company for labour-saving plant. The visitors were received by Mr. Gilbert Little and his sons, and Mr. E. J. Forster, a Director, and welcomed by Mr. Jabez Lones, J.P., the first Mayor-Elect of the new borough of Smethwick. Mr. Lones, who is a large employer of labour in the district, in the course of an interesting speech, said he understood that, in a paper on "Labour Economy," read before the members of the Association on the previous Saturday night, by Mr. Archie Little, he described a number of arrangements of machinery installed by the New Conveyor Company in a variety of works; but the wide applications of the special machinery made in these works might be even more clearly grasped when he stated that since the beginning of the present year orders had been executed, or were at present in progress, for machinery for the automatic transmission of materials in works of very widely different character. After enumerating them, he went on to say that he had heard that a very complete automatic coke-slaking, conveying, elevating, screening, and stacking plant was in hand for the Smethwick Gas-Works; and since he entered the room rumours had reached him of installations for two adjacent gas-works. A satisfactory conveyor to slake and carry hot coke, and relieve the stokers from the severe heat and health-destroying labour of slaking, shovelling, and wheeling it from the retort-house to the yard had long been wanted; and it was satisfactory to them in Smethwick that Mr. Gilbert Little, the Managing-Director of the Company, who for ten years had devoted a good deal of time to the point, should, after many failures, and not a little expense of mind and money, have produced a conveyor to do the work satisfactorily. He (Mr. Lones) was informed that the most highly skilled and experienced gas engineers and owners of coke-ovens all over the country, who had seen the new conveyor, agreed that its many merits were palpable, and the defects which had proved fatal to former designs entirely absent. He was glad to know that this conveyor, for which he thought a great future was assured, had been designated "The Smethwick Patent Conveyor." Figures were put before them on Saturday, in a diagram, showing the rapid progress of the Company; and now that the workshops had again been duplicated, and further large additions were to be made, the progress was likely to be greater in the next than in the past three years during which the Company had been at Smethwick. He was told the output for 1899 and the wages likely to be paid, ought to be more than double the quantities turned out, and the amounts paid, in 1898. These were satisfactory prospects; and he, for one, heartily welcomed to Smethwick such firms as the New Conveyor Company, who brought new industries among them, thereby adding to the prosperity of the town and the comforts of the wage-earning classes of the district.

Mr. Gilbert Little, who is Chairman as well as Managing-Director of the Company, also gave the large party a hearty welcome; and, after the inspection of the works, he entertained them hospitably—the tables being laid in the new millwrights shop. In reply to the toast of "Success to the New Conveyor Company, Limited," he stated that the output in 1898 had been more than double that of 1897; and the contracts and orders on hand left no doubt as to 1899 showing a like increase on 1898. The general trade of the Company for conveyors and elevators had always been a healthy and growing mainstay of the business; but no department of the works was more alive and busy than the one devoted to the manufacture of appliances for gas-works. He had been a consistent and persistent advocate of inclined retorts from the date of their arrival in England; and the recent marked successes of the New Conveyor Company's installations at Nelson, Milan, Batley, Leeds, Middleton, and Cambridge would further encourage the officials of the Company to entertain the idea that at no distant date all gas-works with a make of upwards of 500,000 cubic feet a day, or 50 millions a year, would be equipped with retorts charged and discharged by the natural law of gravity. He was glad to see so many engineers and managers of gas-works present; and he believed he was justified, from the references which had been made to the "Smethwick" coke conveyor, in anticipating a wider application and closer connection for the Company's manufactures in gas-works. It might be true that the majority of inventors and specialists lost their ideals with the disappearance of their hair; but, however numerous his ideals had been —and many of them were now buried too deep for resurrection—he could truthfully state that as his hair became thinner the stronger became his ideal, and the firmer his hope, of producing a durable design of conveyor to automatically slake, convey, screen, and stack coke, and relieve the men in the retort-house of the inhuman labour required to do the work. As the "Smethwick" coke conveyor would be described in detail with the aid of large drawings, by Mr. Holgate, of Halifax, in a paper on "Coke-Handling Machinery" at the forthcoming meeting of the Institution of Gas Engineers in London, he would not refer to it further.

It may be added that the new workshops are equipped with larger and heavier tools than those in the premises inspected by the members of the Midland Association of Gas Engineers during their visit to the Company's works in the autumn of 1897. One feature of the new shops is the large hydraulic plant, consisting of powerful three-throw pumps, accumulators, and twin-presses, with rams of 6, 8, 12, and 16 inches, to stamp the conveyor troughs, elevator casings, measuring-chambers, and charging-shoots at one operation. Three large punching and shearing machines, radial drills, angle, T, and channel-iron cutters, large cold saw for buck-staves, and plate mangling, joggling, and straightening tools of the heaviest build, have been put down for the manufacture of the structural, hopper, and charging appliances for retort-houses.

THE LONDON GOVERNMENT BILL.

The Bill "to make better provision for Local Government in London," introduced by Mr. A. J. Balfour on the 23rd ult., and noticed in our editorial columns last week, has been issued.

In the first clause, provision is made in the following terms for the establishment of Metropolitan boroughs in London: "The whole of the Administrative County of London, exclusive of the City of London, shall be divided into Metropolitan boroughs (in this Act referred to as boroughs); and for that purpose it shall be lawful for Her Majesty, by Order in Council, subject to, and in accordance with, this Act, to form any area into a borough with the boundaries specified in the Order, and to establish and incorporate a Council for the borough: Provided that (*a*) each of the areas mentioned in the first schedule to this Act shall be formed into a separate borough, subject, nevertheless, to such alteration of area as may be required to give effect to the provisions of this Act, and subject also to such adjustment of boundaries as may appear to Her Majesty in Council expedient for simplification or convenience of administration; (*b*) every other borough shall, unless for special reasons stated in a report which shall be laid before Parliament, have either a rateable value exceeding £500,000, or a population between 100,000 and 400,000." Clause 2 deals with the constitution of Borough Councils, and provides that the Council of each borough shall consist of a mayor, aldermen and councillors, the total number of the two latter not to exceed 72. Clause 3 orders that the first elections of all borough councillors under the Act are to be held on Nov. 1, 1900, "or on such later day, as soon as practicable thereafter, as may be fixed by the Lord President of the Council." The second part of the Bill sets forth the powers with which it is proposed to clothe the new Borough Councils. Clause 4 provides that on the appointed day "every elective Vestry and District Board in the County of London shall cease to exist;" their powers and duties being thereafter transferred, with their property and liabilities, to the Council for the borough comprising the area within which such powers are exercised—the Clerk of the Council being thenceforth called the Town Clerk. Clause 5 contains provisions for the transfer from the London County Council to the Borough Councils to be created under the Act of powers set forth in Part I. of the second schedule. The Committee of the Privy Council are directed by clause 6 to make a Provisional Order "determining which of the powers under the London Building Act, 1894, or any amending Act, ther than the powers mentioned in Part I. of the second schedule to this Act, are to be exercised by the London County Council and the Borough Councils respectively." Clause 7 embodies the additional powers and duties of the Borough Councils; its provisions relating to the maintenance of main roads and highways, the stopping up of streets, &c. Borough Councils are to have the same powers of promoting and opposing Bills in Parliament as are conferred on Borough Councils outside London. Clause 8 makes provision for defraying the expenses incidental to the transfer; and clause 9 deals with Committees.

The next part of the Bill applies to rates and Overseers. Clause 10 directs that a scheme under the Act shall provide for all the expenses of a Borough Council being levied out of the general rate, and for the discontinuance of a separate sewers rate and lighting rate. Clause 11 provides for the appointment of Overseers and such officers as may be required to assist them in the transaction of their business; clause 12 makes the City of London liable to the London county rate; and clause 13 provides for the appointment of Assessment Committees.

The fourth part of the Bill relates to orders and schemes issued by Commissioners approved by a Committee of the Privy Council (such Commissioners having power similar to that possessed by Inspectors of the Local Government Board); and it is ordered that any expenses incurred by the Committee shall, to the amount certified by the Treasury, be paid by the London County Council out of the county fund. Clause 15 enumerates the several matters for which a scheme under the Act may make provision; and clause 16 makes rules as to boroughs and parishes. The next clause deals with detached parts of parishes; clause 18 enables Woolwich to be brought under the operation of the Act; and clause 19 contains a special provision as to Penge.

The remaining clauses embody supplementary powers; clause 27 containing the necessary definitions, and clause 28 setting forth that the London Government Act, 1899, is to be the short title.

The first schedule provides that the following areas are to be boroughs: The parishes of Battersea, Camberwell, Chelsea, Fulham, Hammersmith, Hampstead, Islington, Kensington, Lambeth, Lewisham, Paddington, St. Marylebone, and St. Pancras; the districts of Poplar and Wandsworth, and the area of the ancient parliamentary borough of Westminster, consisting of the parishes of St. Margaret and St. John, Westminster, the parish of St. George, Hanover Square, the parish of St. James, Westminster, the parish of St. Martin-in-the-Fields, and the district of the Strand Board of Works.

The first part of the second schedule enumerates the minor powers and duties which are to be transferred from the County Council; and the second part defines the powers of the County Council which are also to be exercised by Borough Councils. The latter include powers under sections 17 to 25 of the Metropolis Water Act, 1871, with respect to regulations of Water Companies; the power to be exercised only with respect to a Company supplying any part of the borough.

The third schedule specifies the seven enactments which are to be in part repealed by the Act.

SALES OF STOCKS AND SHARES.

At the Auction Mart, Tokenhouse Yard, E.C., last Tuesday, Mr. Alfred Richards conducted a sale of stocks and shares of old-established gas companies—in most cases by order of the Directors. The first lots offered consisted of a new issue of £10,000 of ordinary stock of the Plymouth and Stonehouse Gas Company, ranking for a standard dividend of 5 per cent. per annum, subject to the sliding-scale; the last dividend on similar stock having been at the rate of 6½ per cent. per annum. The stock was not all sold; but what was disposed of fetched £150 per £100—yielding £4 1s. 8d. per cent. on the investment. A new issue of £5676 of 4 per cent. perpetual debenture stock of the Hornsey Gas Company was next offered; and it found purchasers at £120 and £120 5s. per £100—yielding £3 6s. 8d. per cent. on the investment. The sale of this stock produced £6813 4s. A few fully-paid "B" shares (£50) in the Portsea Island Gas Company (last dividend 13 per cent.) were sold for £149 each; yielding £4 7s. 3d. per cent. to the purchaser. Some "C" shares of the same nominal value, on which the last dividend was 12 per cent., were bought for £142 10s.; yielding £4 4s. 3d. per cent. A parcel of £10 shares (issued as fully-paid) in the Chigwell Gas Company, bearing 7 per cent. dividend, were sold for £16, £16 2s. 6d., and £16 5s. apiece; being an average of £16 1s. 9d., at which price they returned the purchaser £4 7s. per cent. The sale of this parcel produced £3217 10s. Some 5 per cent. perpetual debenture stock of the Wandsworth and Putney Gas Company was sold at the rate of £157 10s. per £100; yielding £3 3s. 6d. per cent. to the investor, who takes the interest accruing from the 30th of September last. The entire sale produced £17,044 14s.

The following are among recent sales: On the 22nd ult., Mr. R. Mack conducted a sale by auction of £25,000 of ordinary stock of the Newcastle and Gateshead Gas Company. The biddings were taken at per £100 stock, each ranking for a standard dividend of 7 per cent., subject to the sliding-scale, under which, while the price charged by the Company remained as at present, the authorized rate of dividend payable on the Company's ordinary stock would be £9 5s. per cent. per annum. It was sold at prices ranging from £223 to £236; the latter being the price of the stock quoted on the day of sale. The next day, at Sunderland, Mr. Atkinson Gibson offered for sale some new stock in the Sunderland and South Shields Water Company; the maximum dividend on it being 5 per cent. The object was to raise £18,100. The highest price obtained was £130 10s. per cent., and the lowest £129. On the same day, Messrs. Garrod, Turner, and Son disposed of £340 of "A" stock of the Ipswich Gas Company, in £10 lots. One lot fetched £31 5s., and the rest £31 each. A number of new £10 shares in the Dover Gas Company were also offered for sale on that day, and realized altogether some £3973; averaging £19 17s. 3d. per share. A few fetched as much as £21 10s. each; the lowest price being £19 5s. The top price and the average were the highest ever reached. Messrs. Nash and Son recently disposed of some fully-paid £10 shares in the Farnham Gas Company at prices ranging from £22 10s. to £23 each. At a sale lately, £180 of new ordinary stock (1897 issue) of the Gosport Water Company was sold at the rate of £148 per £100; three fully-paid £25 shares in the Gosport Gas Company realizing £45 5s. each. Messrs. Hollis and Webb held a sale of stock and shares at Leeds last Tuesday; among the lots submitted being some gas stock. A small amount (£30) of Harrogate "B" gas stock sold at £90; a few Crossgates Gas Company's shares, at £7 15s. each; and fifty Aberystwyth Gas Company's new 5 per cent. preference shares at £10 10s. each. This price was also paid for 200 of the shares purchased privately before the sale. At Brighton, on the previous day, Messrs. Ridley and Hollis sold £400 of "A" ordinary consolidated stock of the Brighton and Hove Gas Company at £79 per £40 lot. Last Thursday, Messrs. Alexander, Daniel, and Co. sold £15,000 of Bristol Water-Works 7 per cent. maximum consolidated ordinary stock. The reserve price was £154 per £100 of stock; and the £15,000 worth realized £23,556 15s. The highest price was £158 5s., and the lowest £156 5s.; the average being a fraction over £157. At a recent sale of shares in the Australian Gaslight Company, £18 each was realized; being a premium of 200 per cent. Mr. C. D. Lerry last Tuesday offered for sale 49 original shares of £5 each, fully paid, in the Chatham, Brompton, &c., Water Company. Seven shares realized £15 7s. 6d. each; and five others, £15 5s. each. The bidding then fell to £15 2s. 6d.; whereupon the remaining shares were withdrawn. On Thursday, 200 shares in the Dover Gas Company changed hands at an average of £19 19s. per share. Mr. A. A. Burnett on Friday disposed of 500 £10 new ordinary shares in the South Hants Water Company; the total amount realized being £7987 10s.

ELECTRIC LIGHTING NOTES.

Acting on the advice of Mr. W. C. C. Hawtayne, the Lowestoft Town Council last Tuesday decided to accept (subject to the consent of the Local Government Board being obtained to a loan) a number of tenders for the supply of the plant required for their electric lighting works. The amount for which application is to be made is £30,000.

After a sitting extending from last Wednesday evening till one o'clock the following morning, the Hackney Vestry have adopted the scheme of electric lighting in conjunction with dust-destruction which, as already mentioned in the "JOURNAL," Mr. Robert Hammond had prepared, the cost of which will be £242,367. Mr. Hammond has been appointed Engineer to the Vestry; and the Electric Lighting Committee are now on the look-out for a site for the station.

The sale of the Birmingham Electric Supply Company's works to the Corporation will probably be confirmed by the Bill which the latter are promoting in the present session; but, in the meantime, it was a condition of the agreement that the Company should pay a dividend of 6 per cent. from Jan. 1, 1898, until the completion of the purchase. The ninth annual report of the Company has just been issued; and it shows ample funds for the purpose. The amount of net profit, including £989 brought forward, is £18,516, of which £5307 has been placed to the credit of the depreciation reserve fund. The dividend at the above rate (part of which has already been paid) will absorb £11,999, leaving £1209 to be carried forward.

The Hampstead Vestry last Thursday received, without discussion, a report from the Electric Lighting Committee, stating that they had considered the complaints received from consumers in the neighbourhood of Kilburn, of the failure of the electric light on the evening of the 15th ult., and found that apparently it resulted from a "short" on the switchboard in the sub-station, and that the Committee were seriously engaged in devising means to guard against a similar accident in the future. At the same meeting, the Vestry decided to inform the London County Council that they are prepared to take up the loan of £2590 for extensions to the arc lighting, to be repaid by annual instalments within 42 years; interest to be at the rate of £3 2s. 6d. per cent. It was further agreed that the cost of all renewals of plant, &c., should be paid out of a sinking fund, or out of the maintenance account.

METROPOLITAN WATER SUPPLY COMMISSION.

Fifty-Fifth Day—Monday, Feb. 27.

(*Viscount* LLANDAFF, *Chairman*, *Sir* JOHN E. DORINGTON, Bart., M.P., *Sir* G. B. BRUCE, M.Inst.C.E., *Major-General* A. DE COURCY SCOTT, R.E., *Rt. Hon.* J. W. MELLOR, Q.C., M.P., *Mr.* A. DE BOCK PORTER, C.B., *Mr.* H. W. CRIPPS, Q.C., and *Mr.* R. LEWIS.)

The Commission sat at the Guildhall, Westminster.

The following are the Counsel engaged: Mr. POPE, Q.C., and Mr. CLAUDE BAGGALLAY, Q.C., for the New River and the Southwark and Vauxhall Water Companies; Mr. LITTLER, Q.C., and Mr. LEWIS COWARD for the Kent Water Company; Mr. PEMBER, Q.C., for the Lambeth, East London, Grand Junction, and West Middlesex Water Companies; Mr. RICKARDS for the Chelsea Water Company; Lord R. CECIL for the Hertfordshire County Council; Sir JOSEPH LEESE, Q.C., M.P., for the Kent County Council and Kent Local Authorities; Mr. BALFOUR BROWNE, Q.C., and Mr. FREEMAN, Q.C., for the London County Council; Sir R. NICHOLSON for the Middlesex County Council; and Mr. GABRIEL P. GOLDNEY (Remembrancer) for the Corporation of the City of London.

Mr. PEMBER, in order to render clearer the evidence given by Mr. Wilkins, handed in a statement of the total capital expenditure of the Lambeth Water Company as presented to the proprietors in March, 1854. As to the £84,000, which the Company were supposed to have improperly carried forward as capital, he said that was "moonshine."

Mr. BALFOUR BROWNE stated that the Corporation of Croydon had read the evidence of Mr. Wilkins as to what took place between the Corporation and the Company. Mr. Wilkins had given an erroneous version, and Counsel therefore asked permission to call the Chairman of the Water Committee of the Corporation.

The application was granted.

Mr. *H. Wilkins* was then re-called and questioned as to the capital of the Company. He stated, however, that he had no reliable data on which to make up capital accounts for the years between 1846 and 1854, and that he knew of the existence of none.

Eventually it was arranged, at the instance of the Chairman, that Mr. Gomme and Mr. Wilkins should go through the accounts together.

Mr. PEMBER said he was quite ready to admit what the Chairman seemed to say the other day—that the charge and the explanation were alike inexplicable.

Mr. MELLOR: I assure you every member of the Commission agrees with you.

Sir G. BRUCE: And when you have settled it, the explanation has no bearing whatever upon the question before us.

Mr. PEMBER said that was so. Mr. Gomme had called at the office, and, with regard to one item of £40,000 in connection with the Southwark and Vauxhall Company, withdrew the charge of illegality against the Company, and subsequently made a similar statement as to the other sums in question. If nothing illegal was done, what were they wasting their time on?

Mr. *F. S. Clayton*, the Governor of the Chelsea Water Company, said the Company dated from the year 1722, when they brought water from the Thames near Chelsea Hospital to the neighbourhood of Hyde Park. They had reservoirs in the Green Park, near Lord Palmerston's house, and in Hyde Park, close by the Grosvenor Gate. These reservoirs ceased to exist after the Act of 1852. The Company met with great difficulties in their early days. They plumed themselves on being the first Company to introduce filtering—that was in 1829. Until that time, water had only been purified by being allowed to subside. During the early part of the present century, the Company were under no obligation to supply water; and there were no restrictions as to charge. In 1852, the Company obtained an Act fixing their capital at £300,000, with further share capital of £270,000, and borrowing powers of £90,000 in addition to £80,000 already borrowed. The Company's area of supply was entirely north of the Thames; their works being at Seething Wells. They had not had any competition within his recollection—not since 1817. In that year, a mutual arrangement was come to between the Chelsea, Grand Junction, New River, and West Middlesex Companies, by which competition ceased. There was no formal agreement to this effect; but he believed it was recorded in a minute. Under the Act of 1875, fresh land was obtained at West Molesey; and the Company moved their intake there from Seething Wells. They also bought 50 acres there for use as subsiding reservoirs. The Company still obtained their water at West Molesey; filtering it at Seething Wells. The service reservoirs were at Putney Heath. The banks of the reservoirs at West Molesey were being raised, which would increase their capacity of 140 million gallons by 49 million gallons, or about 15½ days' storage of the average supply of last year. The existing capacity of the reservoir at Putney was 11 million gallons; and another of equal size was being constructed there, and would be finished next spring. For the first fifteen years of their existence, the Company paid no dividends. From 1737 to 1740 4 per cent. was paid; but from then till 1753 the Company could pay nothing. In that year they paid about 1½ per cent., which slowly increased until 1890, when they paid the maximum of 10 per cent. In 1895, the Company commenced paying back-dividends; and to September last a total sum of £10,276 was divided in this way. A little over £700,000 was still due for back-dividends, going back to 1852, when they first had one dividend fixed. At the present rate, witness agreed it would take about a hundred years to pay this off. As to when the consumer would get any benefit by reduction of charges after the back-dividends had all been cleared off, this depended on the sinking-fund clause. But for this clause, the Company could raise their debenture stock at 2¾ per cent.; whereas now they had to pay double as much, or even more. Obviously if they obtained the money at the lower rate there would be more dividend for the ordinary stock, the back-dividends would be cleared more quickly, and the charges could be reduced sooner. There were only about 400 acres in the Company's area where development could occur. Assuming 8000 houses of about £30 were built on this, the increase of revenue would be about £10,000 a year. The powers of the Company were to take 20 million gallons daily from the Thames at West Molesey, and a further 2 million gallons by agreement with the Thames Conservancy. The Company felt convinced that even when their district was full, they would not need more than 17½ million gallons a day. The sinking fund he regarded as unjust, and as an undue interference with the Company as a commercial concern.

By Mr. DE BOCK PORTER: He should not be satisfied with purchase based only on present income. There were the back-dividends to consider, though they might not be all paid for a century.

Further examined: He was against purchase by anybody—certainly by a changing body like the County Council. Such a body would not understand very much of the duties; and being subject to popular election, just when the members began to get an insight into the business they would go out of office. There might be an outcry against water-rates; and the body might be elected on the cry of "Free water," just as they had free education, free libraries, free bridges, and free turnpikes. In this case, he did not see where the security of the 3 per cent., which it had been suggested should be the method of paying for the Company's concern, would be, unless they fell back upon the rates.

By Major-General SCOTT: He was willing to submit to such control as was contained in the Intercommunication Bill now before Parliament—control which would impose on the Company the necessity of executing new works.

In answer to further questions by the CHAIRMAN, witness said that control in the way of directing the Company to go to Wales for a longer supply could not affect the Chelsea Company, because they had a margin of 4½ million gallons daily above requirements. He objected to anyone having power to order the Company to undertake further capital expenditure of (say) £150,000 without the Company having a voice in the matter. He should not object to the establishment of a Government official who in case of complaint would at once make an investigation on the spot in an informal way, rather than leaving the consumer to proceed in the present roundabout and expensive way before a Magistrate for a penalty. Regarding amalgamation, he thought this would be very long and tedious. He did not think the water supply of London would be better managed if the Companies were amalgamated. The area would be very vast; and Directors, having a pecuniary interest in the concern, were not accustomed to lean so much on permanent officials as public bodies were. For several years past the Company had spent about £1000 a year combating Bills promoted by the County Council.

Cross-examined by Mr. FREEMAN: The £1000 a year was for warding off attacks not only from the County Council, but also from Royal Commissions, Committees, &c. Both the Chelsea and the West Middlesex Companies had power to supply in Fulham, where they expected the increase to take place; but they did not compete, as an agreement had been come to.

Mr. FREEMAN: These arrangements are very mysterious. They are never put into writing.

In further cross-examination, witness said if there were no sinking fund the Company might pay off the back-dividends in fifty years.

Mr. *G. H. Gill*, Secretary of the Chelsea Water Company, said the Company estimated they would only have to spend £350,000 to meet the wants of their district till 1937, when the population, it was calculated, would be 354,819. This figure was arrived at on the basis of the number of supplies and the population of the district shown by the Census of 1896. The position of the Company as regarded development was quite exceptional; the area being wholly in the Metropolis, and entirely surrounded by other Companies or by the river, and there being only 400 acres in it unbuilt over. The expenditure of £350,000, which would provide for a very much larger population than they expected to have to supply, was composed of the following items: Completion of piping in the Fulham district, £17,000; ordinary expenditure in district, meters, &c., £30,000; extensions of district mains, £10,000; reservoir at Putney and additional main power from Putney to Surbiton, £97,000; additional pumping power at Surbiton, £20,000; additional filters at Surbiton, £20,000; and additional storage, £151,000. The latter item included the cost of raising the banks of the present reservoirs at Molesey.

The CHAIRMAN: How many gallons do you, in your estimate, allow for your 354,819 persons?

Witness: 17½ million gallons would give 50 gallons a head, which shows that this estimate is absurdly large. If the supply were 35 gallons a head, only 12,418,000 gallons would be required; while if it was 44½ gallons per head—the highest figure appearing in the Water Examiner's reports—the consumption would only be 15,789,000 gallons on the average. The average daily supply in 1898 was 1,279,000 gallons.

Then without further powers you could supply all your wants for the next forty years?—Yes, and have a margin.

By Major-General SCOTT: He had not estimated what further expenditure would be required if the future supply were placed under conditions similar to those of the Staines storage reservoirs; but the present provision for storage would be ample for all conditions, unless they fixed the flow at Teddington Weir at not less than 200 million gallons and assumed the conditions of 1898.

The CHAIRMAN remarked that, in his view, the Balfour Commission intended that storage should be provided for existing, as well as future, supplies.

By Major-General SCOTT: He agreed that according to Lass's tables the Chelsea Company were at present incurring expenditure of £292·49 per million gallons supplied—the highest figure of all the Companies. He could not say what the item would work out to in the future. The present high figure was due to the Company having had to twice remove their works; and it was not therefore fair to compare this rate with what it would be in the future.

The CHAIRMAN: Then you let in the County Council argument about obsolete works and capital. You cannot have it both ways.

In further examination, witness said that the supply of the Company had largely increased during the past few years, which was due almost entirely to their having, since 1882, been putting the district under constant supply. Now that this operation was completed, the Company were going to pay much more attention to preventing waste, by the use of Deacon's meters. He handed in a table giving the result of applying

these meters to eleven districts in Fulham, containing 7349 houses, and an estimated population of 50,703. The average consumption in these districts was by this means reduced to 18·6 gallons per head per day. About 25 per cent. would have to be added for trade supplies. It was not expected that the consumption over the whole district would be reduced to anything like 18·6 gallons. Over the whole area, the supply had been from 40 to 43 gallons a head daily for some years past; but when the efficient system of checking waste was extended, this figure would be much reduced. The question had been raised of giving additional powers to the Companies in regard to checking waste; but it was not pressed.

The CHAIRMAN: Now, here is your time?

Witness: The Engineers did go into that some years ago; but the matter has not come to a head yet.

By Major-General SCOTT: He had not made any calculation as to the financial effects of saving (say) 5 million gallons a day. Such a calculation, though difficult, could be made. It would be a decided advantage if the Companies could insist on better fittings being used.

In answer to further questions by the CHAIRMAN, witness said that in the Company's district nearly all the houses had cisterns; the Company having refused to lay on water unless cisterns were put up. If a cistern were removed, he thought the Company had power to cease supplying. Until 1852, the Company charged as they liked. In that year, however, annual value was made the basis of charge. To ascertain the annual value, the Company took the rent as a guide, but did not adhere to it strictly. Then came Dobbs's case, which said that annual value meant net rateable value. The effect of this was that the rates on some houses were reduced, and on others increased. On the whole, the Company gained. The Chairman referred in detail, as an example, to the case of No. 30, Queen Anne's Gate, the water-rate on which in 1845 was £3 6s., in 1878 £8 18s., in 1884 £10 12s., in 1886 £13 18s. 4d., and in 1892 £14 14s. 8d. Witness was unable to give reasons why these increases should have occurred; but he said there were an immense number of cases of the reverse order. He put in a statement showing that on over 40 properties in the Fulham district the amounts charged by the Company had decreased from £57 14s. in 1852, to £37 6s. 8d. in 1894. This was due to decrease in rateable value. Similarly, the amounts charged by the Company on 22 properties in Redcliffe Square and Finborough Road had decreased from £133 12s. in 1872-3, to £96 14s. 4d. in 1894. Another table handed in by witness showed that at the quinquennial valuation of 1891, as compared with 1886, there was an increase in rateable value of £68,030 in the case of 5136 properties in which assessments had been raised; though the properties were not known to have been altered. While, on the other hand, there were 6756 instances in which the assessments had been reduced by £44,340. The rates charged on the Company's premises were £7952 in 1885; and £9718 in 1891. At the next quinquennial valuation the figure was £13,088; and now the Company's rates were £15,000 odd per annum.

Cross-examined by Mr. FREEMAN: He knew that in 1851 various properties in the Company's area were given in evidence, with their assessments. It might be that a rise of nearly 100 per cent. would be shown, in some cases, in the values of 1851 compared with those of 1891.

Mr. FREEMAN: In all instances?

Witness: In all the instances that were picked out it probably would.

I am talking of 10,165 properties that were picked out, and taking the same 10,165 properties now?—I cannot really say.

Fifty-Sixth Day—Tuesday, Feb. 28.

With the exception of Sir George Bruce and Mr. H. W. Mellor, Q.C., all the members of the Commission were present.

Mr. *G. H. Gill*, the Secretary to the Chelsea Water Company, was re-called for the purpose of describing the circumstances under which the boundaries of his Company's district were originally fixed by mutual arrangement with the Grand Junction, New River, and West Middlesex Companies. Upon the question of waste, he stated that by means of strict inspection, and by the use of the Deacon meters in a certain part of the Fulham district, the Company had been able to reduce the consumption of water by 7 gallons per head per day. To the suggestion of the Chairman that, in these circumstances, it ought to pay the Company to extend the system throughout their district, witness remarked that it cost more than would be generally supposed.

Sir J. DORINGTON: It has been said that in some cases waste is cheaper than inspection.

Witness: It is not so with us.

Mr. POPE: Where there is a pinch in the supply of water, the saving of waste is of enormous importance to the Company.

Questioned by Mr. LEWIS, witness confessed himself unable to give the Commission an estimate of the saving which might be effected if the system referred to were adopted throughout the whole of the Chelsea district.

The CHAIRMAN inquired whether any of the other Companies had had similar experience, as he was very much struck by the figure given by witness.

Mr. POPE and Mr. PEMBER promised that similar information should be furnished to the Commission by the Companies whom they represented; the latter remarking that what had just been described was not nearly so startling as the results achieved at Oxford and other places.

Mr. LITTLER believed that at Norwich it had been found possible to reduce the daily consumption to 15 gallons per head.

Sir *W. Hart Dyke*, M.P., Chairman of the Kent Water Company, was then examined by the CHAIRMAN. He stated that there was no dissatisfaction in their district with the existing water supply, which was admittedly good in quality and abundant in quantity. Not only had no complaints been made or suggestions offered for change of administration, but on various occasions the Local Authorities had applied to the Company to extend their area of supply. The affairs of the Company were well and carefully managed. It was a prosperous undertaking; and the public were benefited by it. Under these circumstances, he contended that any change was uncalled for. There was a strong feeling against the London County Council being given any statutable authority in the county. The water consumers were increasing; but the Company had an ample supply of water, and there would be no difficulty whatever in providing in the future, as in the past, for an increased supply by sinking further wells. The Company were now paying their maximum dividend of 10 per cent., and making a substantial return in respect of back-dividends. The market value of the shares had long been based, not only on the right to the 10 per cent., but also on the right to the back-dividends; and it would be manifestly unjust to deprive the shareholders of the back-dividends assured to them by Parliament. It was calculated that in 23 years' time the back-dividends (now amounting to £900,000) would have been paid off; and the consumers would then get the benefit of a reduction in price. Witness submitted that purchase should only be determined upon in the last resort, whether in the interests of the shareholders or of the consumers. He was strongly in favour of the Intercommunication Bill now before Parliament, and of the additional powers of public control which it contained. Personally he considered that the public had a perfect right to demand all reasonable information as to the effect of the pumping operations of the Company on neighbouring wells and springs, and other matters; but he was strongly opposed to any closer scrutiny of their works.

The CHAIRMAN: If the contention of the Herts County Council is anywhere near the truth, it points to an entire revision of the law of underground water.

Witness (continuing) expressed the opinion that the water in the chalk stratum of Kent would far exceed the 27½ million gallons a day calculated upon by the Balfour Commission, and that in fact it was well nigh inexhaustible. Upon the question of the general policy of purchase, it must be borne in mind that the Companies had voluntarily made an immense change in the position with which Parliament now had to deal. For the first time in the history of the country, great commercial undertakings were, by the Bill of this session, voluntarily placed in the hands of a Government Department; and the Local Government Board were given not only extraordinary powers with regard to inspection, but unlimited command of the expenditure of the Companies, both as regards present and future supply. Intercommunication would do away with the risk of emergencies like the drought of last year, and would ensure a constant supply to the water consumers of the Metropolis. The £15,000,000 which the Companies proposed to spend upon storage would meet the necessities of the case for many years to come; and in these circumstances it was extremely undesirable to throw over the watershed of the Thames even before purchase was decided upon.

The CHAIRMAN: These observations, I gather, are directed against going to Wales. You think the resources of the Thames Valley, together with the additional storage, are sufficient?

Witness: Yes.

I quite see the force of your arguments. Would you see any objection to the other seven Companies being purchased by a public authority, and your Company, which is self-contained and therefore occupies an exceptional position, being left as at present?—I do not think the purchase of the other seven Companies would be injurious to us. In the event of the Kent Company being purchased by the London County Council, the county should be left independent both as to the sources of supply and distribution of water.

Mr. *Alexander Dickson*, the Secretary to the Kent Water Company, said that if it was decided to be in the public interest that the administration of the water supply should be transferred to some other Authority, his Company, while unconscious of any necessity for such transfer, or that the administration would be in any way improved, could scarcely contest this conclusion, if they were secured that the purchase should be by agreement, or, failing that, by arbitration under the Lands Clauses Acts. The consideration under agreement had generally been perpetual annuities, for an agreed income; and the obligations for loan capital had been either taken over as they existed or discharged by annuities. The Middlesbrough case, as a precedent for compulsory arbitration, embodied both, with compensation also for prospective value. In the following instances of the acquisition of water undertakings by municipal authorities, the consideration to the vendors had been perpetual annuities for ordinary or preference shares: Blackburn, Bury, Haslingden, Exeter, Leicester, Chorley (Liverpool), Manchester, Newport, Nottingham, Oldham, Reading, Rochdale, Birmingham, Salford, Wolverhampton, Liverpool, Middlesbrough, Edinburgh, Glasgow, Dundee, and Scarborough. In the cases of Bradford, Brighton, Burnley, Bury, Haslingden, Cardiff, Derby, Exeter, Leicester, Chorley (Liverpool), Manchester, Newport, Nottingham, Reading, Sheffield, Birmingham, Northampton, Salford, Wolverhampton, Liverpool, Middlesbrough, Edinburgh, Glasgow, Dundee, and Scarborough, the mortgage debenture was taken over as it stood. In witness's opinion, the principle of annuities was far preferable and more convenient to the purchaser than cash payment.

The CHAIRMAN; Supposing that a public authority having good credit were able to borrow at 2½ per cent., the public would obviously save ½ per cent. in the transaction by paying cash. Where is the advantage to the purchaser?

Witness: In the mutual accommodation which the perpetual annuities would afford. Payment in cash should be at the option of the shareholders, who in any case should receive an equivalent for their present income; and the prospective value should be assured to them in the form of permanent annuities.

What are the other securities in the market that you would consider equal to the shares of the Kent Company?—Consols and the very highest class of debenture stock.

By Mr. LEWIS: Kent stock was largely held by Insurance Companies.

In further examination by the CHAIRMAN, witness said that the proposal to pay in cash involved this disadvantage to the shareholder—if paid only what the Comptroller of the London County Council would call the proper value of his holding in cash, he must re-invest it at a time when forty or fifty million pounds worth of the best class of securities had been withdrawn from the market, with a consequent rise in the price of the remaining stocks of high order, and when forty or fifty millions of money had also to be re-invested somehow. The shareholder would thus have to face a diminished income if he re-invested, and possibly, by buying in at firm prices, might have, if he needed to sell later on when the demand had died out, to sacrifice capital also. Opportunity would, moreover, be given to the purchasers of obtaining their loans upon reduced terms; and the shareholder might thus find himself practically unable to resist oppression, and with little else to purchase

than possibly a Metropolitan consolidated stock at some lower rate of interest than previously. Water stocks were, by reason of their security and steady growth of income, much sought for; and these features induced investors desirous of providing well-secured life incomes to buy and hold them for the certainty of the income to the beneficiaries. Some mode of compensation should therefore in equity be adopted which would put the vendors in as well secured a position as that from which they were to be displaced; and the substitution of annuities for payments in cash appeared to be the more equitable arrangement, and was obviously preferable in a case involving many times the amount of the largest similar property hitherto dealt with.

The CHAIRMAN: On the other hand, the purchaser would have to issue forty or fifty million pounds worth of new stock, in order to raise the money to pay in cash; so that there would be that amount of first-rate security seeking purchasers before the shareholders of the Water Companies had to part with their securities.

Witness: I presume the interval between the raising of the money and the payment would be so arranged as to avoid great disturbance.

With a view of correcting the misapprehension existing as to the general result of the quinquennial revaluations, witness handed in a summary of the totals of increases and decreases of water-rates upon alteration of the rateable values by the Local Authorities in the Kent Company's district during the ten years 1887-96. From this, it appeared that the total assessments altered were 49,378; and that the net result on the water-rates was a decrease of £369. In this way, it was conclusively established that in the years between any two quinquennia the number of assessments reduced were very greatly in excess of those increased. Statistics showed that the increase caused by the quinquennial revaluation was chiefly on properties upon which the Company did not derive any benefit in increased water-rental. In the seven principal Metropolitan parishes of the Kent Company's district, while the total increase upon revaluation of all properties amounted to £90,915, no less than £84,365 of this arose from the increased assessments of the properties of public companies.

Witness, examined as to the Kent Company's charges, argued that in the case of charges based on quantity, any equalization of the rate per thousand gallons would not secure equalization of charge per person or per house; and the inducement to avoid equality of contribution by parsimonious use of the water and propagation of sanitary evils, would be admittedly undesirable. The charge upon value was favourable to the less weathy—as giving them in their greater necessities as much water as was needed, and putting upon the more wealthy a larger payment for theirs, to make up the general average necessary to recoup the expenses and remuneration for capital. It was distinctly inaccurate to urge that the charges pressed more heavily on the poorer class of occupiers, by comparing only the percentage rates upon which the charges were based. The existing mode of charge secured the opposite result.

The CHAIRMAN: You have no bowels of compassion like the New River Company, and make no reduction to customers in any circumstances?

Witness: I cannot admit that. We make a reduction, for instance, where one occupier has (say) seven or eight shops. We have power to charge for every one; but we put the rents together, and charge for the whole of the shops as one concern.

What have you to say on the question of severance?—Severance under purchase between one or more authorities, upon the principle of giving entire control to the Local Authority of every district of the sources of supply within their respective areas, would be very difficult of application in the case of the Kent Company, by reason of the large population within its London area deriving their supply, as to two-thirds of it, from sources in the districts outside the County of London, and by reason of the outside area being capable of yielding a larger volume of water than the inside area, and a much greater volume from the several sources than was needed for the supply of the population in the respective districts of the particular Urban or Rural Authorities in which these sources happen to be. I have not yet heard any practical man advocate severance of this description.

Enumerating the advantages of unification as compared with partition, witness pointed out that the severance of outside sources from those inside would involve the dependence of the greater population within the County of London upon the Local Authority of some other and less important area outside for a large portion of its water; and as the additional supplementary sources were generally sought in the outside areas, in process of time this aspect of the case would become of growing importance to the Metropolitan section, where the increase of population would doubtless be greater, because of the area of uncovered building land it now contained and the greater facility of access to the Metropolis. In contrast with the results of severance, a unified administration, with common control of the sources and the necessary arrangement of mains would enable the transmission of the water, not only from the outside to the inside area, but from any one pumping-station to more than one district; so that in case of emergency there would be practically the equivalent of a duplicate system, which would be more difficult and costly to effect under a dispersion of the sources among many authorities. Unquestionably the unified administration of the Kent Company had operated beneficially to the consumers, both within and outside. Those within had had the advantage of the larger supply obtainable from the enlarged area; and those outside had had the advantage of the expansion, by being able to obtain from a stronger Company a supply of water on better terms than they could have secured it for themselves in small sectional works.

The Commission then adjourned.

The fifty-seventh sitting of the Commission was held yesterday, at the Guildhall, Westminster—Lord Llandaff presiding. Mr. Dickson, Secretary of the Kent Water Company, was further examined by the Chairman on the subject of severance. He said the sources of supply of the Company outside the County of London yielded greater quantities of water than the outside districts required; while the inside sources were much less than the requirements. This constituted one of the great difficulties of severance. Further difficulty would arise when it became necessary to increase the supply, as the London authority would probably endeavour to take it from the outside areas.

THE BURY CORPORATION WATER BILL.

A Proposed Joint Board.

A series of interviews and conferences have taken place between the members of the Parliamentary Committee of the Bury Town Council and representatives of the Local Authorities in the water-supply area of the Corporation with respect to the Bury Water Bill now before Parliament; and the outcome is that the preliminaries of a basis of agreement for the formation of a Joint Board, consisting of representatives of the authorities interested, for the control of the Bury water undertaking have been agreed upon. Although the details of the scheme have not yet been finally determined, it has been broadly agreed that a clause shall be inserted in the Bury Water Bill providing for the constitution of a Joint Board to take over the whole of the liabilities of the water-works, together with the entire assets, with the exception of the Chesham reservoir, which is always to remain the property of the Corporation. The Joint Board will repay to Bury the amount which the Corporation have paid since 1872 to the credit of the water undertaking by means of the public water-rate—less the amount properly chargeable to that rate for providing a supply of water for protection against fire and for sanitary purposes—together with the contributions which have been paid since 1872 out of the general rate towards the annual deficit on the water undertaking, *plus* interest on the two amounts at the rate of 3 per cent. per annum from the time the contributions have been made. The amount to be paid to Bury has not yet been definitely calculated; and as to the period of repayment, it has been agreed that the amount can be paid either within three months from the formation of the Joint Board or remain on mortgage at 3 per cent. per annum, payable at six months' notice on either side. The representation on the Joint Board will, it is expected, be governed by the amount of the contributions to revenue; and bearing in mind the fact that the undertaking has been so long maintained by Bury, it has been agreed that the Chairman of the new Board shall be appoinied for at least five years out of the Bury representatives, and that the meetings shall always be held in Bury. The total liabilities of the Corporation in respect to the water-works are estimated at between £800,000 and £900,000.

NOTES FROM SCOTLAND.

From Our Own Correspondent.

Saturday.

The Edinburgh and Leith Gas Commissioners held a meeting on Monday, at which the report of the Engineer (Mr. W. R. Herring) as to the output of gas during January was submitted. This showed a total increase, as compared with the same month of 1898, of over 21¼ million cubic feet. Of this more than 17 millions were from the Edinburgh works. Referring to the matter, Bailie Kinloch Anderson said it was quite an abnormal increase, and it was due almost entirely to the dark weather. In Edinburgh the increase was equal to 12 per cent. It had to be borne in mind that it took place notwithstanding the competitive light. Besides the weather, there were the number of gas-cookers to be taken into account. Of these they had now 1787 on hire, as against 1243 in the previous January. This was in Edinburgh alone; but there had been a very considerable increase in Leith and Portobello as well. I observe from the report that in the Edinburgh works there were in all 490 retorts in use, as compared with 412; in the Leith works there were 254, as compared with 232; and in the Portobello works there were 31, as compared with 27. These figures are a commentary upon the state of the weather. The Finance and Law Committee reported, among other things, the redemption of two lots of annuities—one of £41 6s. 11d., which they acquired for £1235 1s. 8d.; and another of £4 3s. 4d., which they acquired for £124 11s. These figures are both over 30 years' purchase, and higher than the rate fixed by the Act of Parliament, which is 28½ years' purchase. But compulsory purchase does not come into force till 1908; and the Commissioners find it cheaper to give a little more in the meantime rather than go on paying the annuities. Besides, unless they offered an inducement, they would not get holders to part with their annuities. The Commissioners have only two statutory pensioners on their list—one receiving £250, and the other £200. There is only one other remaining who is entitled to claim a statutory pension; that is the respected Treasurer to the Commission (Mr. John S. Gibb). The Commissioners fixed their annual statutory meeting to be held on Monday, the 13th inst. The annual dinner is to follow on the evening of the same day. On this subject, there was a good deal of carping talk by two members, which need not be further referred to, unless it should come up again, which one of the speakers threatened that it would.

Mr. Kinnaird, of Leith, asked why the price of coke had been raised. Mr. Herring replied that there was at present such an enormous demand for coke that it was impossible for them to meet even half of it. He found that, by a remit, the Commissioners had put it into the hands of the Convener to settle the price. He consulted with him; and as a consequence the price had been raised. It would help to meet the increased cost of coal; and he thought there was no doubt that the price of coke would go up higher yet. Bailie Kinloch Anderson added that Mr. Herring had looked out a coal which yielded a large quantity of coke.

Mr. G. Malam, the Manager of the Dumfries Gas-Works, has been asked to prepare a scheme whereby the workers may get Sundays off and a long shift shortened. The men have been moving in the matter; and, more than that, they have done the most unusual thing of writing to a newspaper to say that they had overstated the amount of time which they require to draw and charge the retorts. Men possessing such tender consciences should not be difficult to manage.

The Edinburgh Architectural Association, on the afternoon of Saturday last, visited the works of Messrs. James Milne and Son, Limited, of Milton House, Edinburgh. Visitors were conducted over the establishment by the Directors of the Company. Messrs. Milne are able to show a receipt granted by their firm 150 years ago, since when there has been a continuous series of members of the family in the business. Mr. James Milne, the present Managing Director of the Company, is the fifth in succession who has been at the head of the undertaking.

The deputation from the Dundee Gas Commission who went to

Glasgow last week, reported to the Works Committee on Tuesday that Mr. Foulis had strongly recommended the formation of a bank, 12 feet high, along the north side of the gas-works, upon which coal-waggons could be run, and from which the coal could be tipped into the hoppers. By this means the retorts would be charged at a much cheaper rate than now, and shunting would be to a large extent avoided. The Committee resolved to adopt Mr. Foulis's suggestion. On the subject of the erection of a new gasholder, the Committee instructed Mr. M'Crae to prepare plans showing how he proposed to utilize the present works, as well as the ground recently acquired, for present and future needs. The plans are to be inspected by the Committee, and then sent on to Mr. Foulis for his consideration. Such a display of Scotch caution I have seldom seen. There is no outward opposition to the proposed extension of the works; and the reason for all these conferences and delays is not apparent.

A meeting of the Glasgow Corporation Gas Committee took place on the 23rd ult., when the Engineer (Mr. W. Foulis) reported verbally with reference to the Gas and Water Bill before Parliament, and promoted by the Corporation to obtain authority to acquire the lands of Easter Blochairn and portions of adjoining lands. He said it was very desirable that the purchase should be completed as early as possible, so as to enable him to put down bores and ascertain the proper sites for the several sections of the proposed new gas-works, and proceed with the preparation of the necessary plans. There was also submitted to the Committee a valuation of the lands, obtained from an outside valuer. Subsequently Mr. Paterson moved that an offer be made for the purchase of the lands of Easter Blochairn extending to 85 acres 19 poles, at the price of £530 per acre (including the minerals), all subject to the approval of the Corporation. An amendment was submitted in favour of the Corporation offering the price of £43,759, being at the rate of £600 per acre for 12 acres, and £500 per acre for the remaining 73 acres 19 poles. The matter went to a division, when 15 votes were recorded for the motion, and 4 for the amendment.

The shareholders of the Cupar Gas Company met on Thursday, in response to a circular issued by the Directors, in which they stated that they, "having found it absolutely necessary for the requirements of the Company to erect a new gasholder and steel tank of a capacity to hold 100,000 cubic feet, have resolved to recommend to the shareholders of the Company that this be carried into effect, and that the new holder and tank be erected on the ground recently acquired from the trustees of the late Mr. Duncan M'Nab, and adjoining the works. The cost, it is estimated, will not exceed £3000." The shareholders unanimously adopted a resolution to increase the capital for this purpose.

The "Glasgow Herald's" Man on 'Change reports as follows this week: "In the gas coal trade, there has been a general advance of prices for both second and third class cannels. First-class cannels are somewhat slow to move; but the demand is improving, and higher prices are anticipated. It is stated that the Glasgow Corporation have been very short of coal during the past fortnight, and have had to buy extra quantities at increased prices. This also applies to other gas-works in the West of Scotland and elsewhere. During the winter, the increased consumption of gas has been very great; and on account of the high prices paid for coal during the summer months, corporations have bought short, and are therefore buying now for the next three months to keep them going until their usual time comes for being in the market." I would advise that too much reliance should not be placed upon this information. It is, of course, furnished by someone in the trade, whose desire naturally is that prices should go up. The market is undoubtedly rising, and it may go up a little further; but there is no occasion for panic. The statement that corporations bought short is only applicable to one or two places. There is a shortage of coal in many works; but it is due to the extra output of gas during the dark weather in December and January, which has caused estimates to be exceeded.

The unusual event of the bursting of the dam of a reservoir occurred in Fifeshire on Thursday morning. The District Committee of the County Council had, to provide a water supply for the district of Kelty, thrown an embankment across the outlet of Loch Glow, by which they increased the storage of water from 82 to 254 million gallons. The embankment was 12 feet high at its point of greatest depth. The outside slope was 2 to 1, and the inside slope 3 to 1. The inside was pitched with whinstone rubble; but a space at the top was unpitched, and it is thought that it was this omission which led to the disaster. A strong westerly gale was blowing on Wednesday night; and the water was being dashed with great force against the embankment. It gave way in the centre; and the water rushing through the gap, carried away the entire embankment for a space of from 20 to 30 feet. The level of the loch was thus reduced to what it orginally was. A number of people were obliged to leave their homes, on account of them being flooded; but happily no lives were lost. The destruction to property was very great. The cost of repair, as well as compensation, will fall upon the District Committee, and will be heavy. The amount cannot yet be stated.

[Regarding the paragraph appearing in our Correspondent's "Notes" last week, as to the Troon Gas Arbitration, Mr. James Hogg, W.S., the Clerk to the reference, writes: "My attention has been drawn to a paragraph, which appeared in your last issue, from your Scotch Correspondent, bearing upon alleged difference of opinion between the Arbiters in this reference, and purporting to state such difference in figures. I have to point out that the paragraph referred to is inaccurate; and I shall be obliged by your correcting this in your next issue."—Ed. J. G. L.]

The Use of American Gas-Pipes at Rotherham.—There was a conversation at last Wednesday's meeting of the Rotherham Town Council on the subject of the use of American pipes by the Gas Department; but the raising of the question, it appeared, was merely a political move. However, it had the effect of producing the following interesting information. The contract for the pipes was let some six or seven months ago; and it had resulted in a saving to the department of £350. It provided that all breakages in transit should be made good by the contractor; and out of 1300 lengths delivered 30 were found broken. This was stated to have been entirely due to the method of packing, and owing to the rolling of the ship in crossing the Atlantic.

CURRENT SALES OF GAS PRODUCTS.

Liverpool, *March 4.*

Sulphate of Ammonia.—The greater activity referred to in last week's report has continued throughout the week at advancing prices; and the closing quotations are £10 7s. 6d. to £10 10s. per ton, delivered f.o.b. at the ports. Producers have sold their output as it has become available; and the bulk of the larger makes for March delivery has also been disposed of. There has been extensive covering of sales for first half March delivery; but consumers have come more into line with current prices, and have had a larger share of the buying than has been the case for some time. There has also been increased demand for home consumption. Buyers have been rather shy of the forward position—April-June delivery—in face of the firm attitude of makers, who seemed disposed to advance their quotations further. Speculators have become less confident about offering ahead at a discount on spot prices; and at the close their quotations have for the most part been withdrawn.

Nitrate of Soda remains firm in all positions; though in certain quarters serious efforts are being made to argue the strength of the statistical position away. Spot quotations are 8s. per cwt. for ordinary, and 8s. 3d. per cwt. for refined, quality.

London, *March 4.*

Tar Products.—Pitch is decidedly stronger; and there are more inquiries. Distillers, however, are pretty well committed for their production over the season. The output of pitch, it will be found, is below the average, owing to the very large quantities of oil gas being made, displacing coal gas, and thereby reducing the production of coal tar. Benzols are dull—if anything, worse than before; and the outlook for them is not bright. Prices, however, have got to such a figure that many small distillers are simply mixing off their crude naphtha with the creosote oils. It is worth quite as much money in this form as when sold separately, and has the advantage of being carried at a lower rate. Carbolic acid is firm with improved demand for the spring months; while creosote is said to be scarce, the demand for "pickling" being extremely good just for the time being.

The average quotations during the week are: Tar, 13s. to 19s. Pitch, east coast, 25s.; west coast, 23s. Benzols, 90's and 50's, nominal, 8d. Toluol, 1s. 1d. Solvent naphtha, 1s. 1½d. Heavy naphtha, 1s. 2d. Crude, 30 per cent., naphtha, 3¾d. Creosote, 3¼d. Heavy oils, 52s. 6d. Carbolic acid, 60's, 2s.; 75's, 2s. 6d. Creosote salts, 40s. Anthracene, "A," 4d.; "B," 3d.

Sulphate of Ammonia.—There is a firm market both for prompt and forward delivery; and large business is reported, with an advancing market. The outlook for the Spring is good, and stocks are low. Values in the various positions are as follows: Beckton £10 2s. 6d., London £10 7s. 6d., Hull £10 6s. 3d., Leith £10 7s. 6d., and west-coast ports £10 6s. 3d.—all less 3½ per cent. discount.

COAL TRADE REPORTS.

From Our Own Correspondents.

Lancashire Coal Trade.—The upward movement in prices to follow the advance in wages, so far as new contracts that may come forward are concerned, and to which reference was made last week, has been under the consideration of colliery owners in this and other districts, particularly with reference to the gas coal and locomotive fuel contracts, which are expected to come upon the market during the next couple of months. It is reported that some understanding has been arrived at between the principal collieries in Lancashire and Yorkshire to quote advances of 1s. 6d. per ton for gas coal over last year's rates; and it is also probable that a similar advance will be quoted in connection with the contracts for locomotive fuel. Whether this arrangement will be strictly adhered to, should the competition for the gas coal contracts be at all keen during the ensuing summer, is perhaps doubtful; but it may be taken as an indication of the intentions, at any rate, of colliery proprietors with regard to prices during the forthcoming season. As to the probability of the position being firmly held to, it is perhaps significant to notice that the advances in the contract prices for engine fuel which were talked of last week seem to be hanging fire. In one or two isolated cases, advances of 5d. per ton over current rates are stated to have been obtained on new contracts; but generally there has been practically very little business put through in the way of forward contracts where collieries have held out for higher prices. In fact, representatives of some of the principal collieries are apparently of opinion that the advance which was put on in January has brought prices sufficiently high, and that it may fairly be regarded as having been made in anticipation of the increase of wages. This is certainly the view of the situation that buyers are taking; and they are mostly declining to enter into contracts unless they can be placed on something like the basis of current prices. With regard to the position of trade generally, it remains much as reported last week. The better qualities of round coal are still moving off fairly well. Common round coals are in good demand; and there is also a brisk inquiry for engine fuel. Supplies of slack are, however, perhaps rather more plentiful; collieries here and there having been putting something into stock recently. Prices are without quotable change, and remain at 12s. to 12s. 6d. per ton at the pit for best Wigan Arley, 10s. 6d. to 11s. for Pemberton four-feet and seconds Arley, 9s. 6d. to 10s. for common house coal, 8s. 6d. to 9s. for steam and forge coal, 6s. 3d. to 6s. 9d. for best slack, 5s. 3d. to 5s. 9d. for medium, and 4s. 9d. to 5s. for common sorts. Shipping has been only moderate. Steam coal, delivered at the Garston Docks, is obtainable at 9s. 3d. to 9s. 6d. per ton, at the High Level, Liverpool at 9s. 6d. to 9s. 9d., and at the Partington tips of the Manchester Ship Canal at about 10s.

Northern Coal Trade.—There has been great activity in the coal trade of this district; and prices show general firmness, especially when forward delivery is wanted. When early delivery can be guaranteed, one or two of the collieries are prepared to make slight concessions from the general quotations; but apart from such exceptional circumstances, the tone of the coal trade is exceptionally strong for this period of the year. Best Northumbrian steam coals are now quoted at 11s. per ton, f.o.b., for

early delivery, and up to 12s. 6d. for delivery over the season. Steam small coals are about 5s. 3d. per ton for prompt delivery, and up to 5s. 9d. for forward contracts. In the gas coal trade, attention has been much attracted to some of the contracts that are being renewed for the great Gas Companies. It is not possible as yet to state with any authority the prices that are ruling in the new contracts; but the belief in coal-trade circles that are likely to be well informed is that these large contracts are again being placed at from 8s. to 8s. 3d. per ton, f.o.b. The local demand for gas coal now begins to show a falling off, with the shortening days. Coke is scarce and dearer; and this should benefit the gas-coke producers, who have also a reduced output to place at present. Prices of gas coke are unaltered this week.

Scotch Coal Trade.—The miners have succeeded in disorganizing the coal trade. The masters have agreed to meet them in conference, which is looked upon by many as a preliminary to a compromise. The outcome of the situation is that there is a scramble for coal by home consumers, who are anxious to lay in a stock before the price rises; and as regards foreign trade, it is disposed to go elsewhere. The prices quoted are: Main, 9s. 9d. to 10s. per ton f.o.b. Glasgow, ell 10s. 3d. to 10s. 9d., and splint 10s. 9d. to 11s. The shipments for the week amounted to 139,234 tons—a decrease of 10,771 tons upon the preceding week, but an increase of 712 tons upon the corresponding week of last year. For the year to date, the total shipments have amounted to 1,100,205 tons—an increase of 75,051 tons upon the same period of last year.

King's Lynn Water Supply.—New water-works have just been brought into operation at King's Lynn. The works are the property of the town, and for the last three centuries abundant quantities of excellent water have been drawn from the Gaywood River. The settling-ponds, filters, &c., had become so foul that twice during the last six or eight years Inspectors from the Local Government Board had pronounced the water dangerous. Six years since, the then Borough Surveyor (Mr. E. J. Silcock) was directed to prepare plans for an entirely new system; and these were adopted. It was proposed to sink two wells into the chalk hills at Gayton, six miles from the town, drive headings, construct a pumping-station, rising and gravitation mains, and a covered service reservoir. The wells are 14 feet from centre to centre, each 6 ft. 2 in. in diameter and 100 feet deep. From the bottom of the wells headings 6 ft. by 4 ft. have been driven, as well as a borehole 8 inches in diameter; and the quantity of water yielded is over a million gallons per day. The pumping machinery will be in duplicate, and consists of two sets of boilers of the locomotive type, engines, and pumps, each capable of delivering a maximum of 1½ million gallons per day through 6243 yards of 15-inch pipes, having a rise of 108 feet from the bottom of the wells to the top water-level of the reservoir, which has a capacity of a million gallons, two miles distant. The delivery main is 6900 yards long, and is formed of 15-inch cast-iron pipes; the water being delivered at Lynn with a pressure equal to a head of 104 feet. The works, which were commenced in 1894, have cost between £30,000 and £40,000.

Wallasey Gas and Water Supply.—The Finance Committee of the Wallasey District Council estimate that the surplus on the gas undertaking for the ensuing year will be £911, against £4331 this year—the drop being partly attributable to the reduction of 3d. per 1000 cubic feet in the price; while from the water undertaking the estimated surplus is £3996, against £3768.

The Norwich Town Council and the Gas Company.—At the last quarterly meeting of the Norwich Town Council, the Law and Parliamentary Committee recommended that the corporate seal be affixed to an authority in the action by the Corporation against the British Gaslight Company, Limited, for the rectification of their accounts. The recommendation was agreed to.

Incandescent Gas Lighting at Coventry.—At the meeting of the Coventry City Council last Tuesday, Alderman Andrews alluded to the introduction of the incandescent gas-light system into the city, and said the Gas Committee had now 804 lamps under their control, of which 165 were on the incandescent principle. The cost of 15s. per lamp had been paid for out of the yearly revenue of the Gas Department. In six thoroughfares, too, the ordinary gas-lamps would be soon replaced by incandescent lights.

Gas Workers' Wages at Darlington.—At the meeting of the Darlington Town Council last Thursday, the report of the Gas Committee contained a letter from Mr. Hugh Lynas, the District Secretary of the Gas Workers' and General Labourers' Union, in which he stated that the list of alterations in wages, &c., passed by the Committee, which had been forwarded to him, had been laid before a meeting of the members, and they had accepted the Committee's terms. The writer asked for arrears of pay from the 1st of January, the date of the new arrangement.

The Fatal Gas Poisoning Case at Crosby.—A defective gas-fitting and no ventilation in a bedroom are responsible for the death of Mary Parsons, who (as recorded in last Tuesday's issue) was poisoned by gas at Liverpool Road, Crosby, on the previous Thursday night. The evidence given at the inquest by the son of deceased (George Parsons) will supply an argument to those who are in favour of the general inspection of gas-fittings. He stated that on the Friday morning he entered his mother's bedroom about 8.30, and found her lying back in bed unconscious and moaning. The room was full of gas. A doctor was at once summoned, but his (witness's) mother died at 9.45. It was her custom sometimes to leave the light burning in the room. Afterwards, he examined the gas-tap, and found it was turned on; but there was no light. The fireplace was covered with paper; and no current of air could get up the chimney. The window and door were also closed. He did not think the pressure of the gas was reduced in the district at midnight. The Coroner remarked that in some places it was the habit of the gas officials about eleven or twelve o'clock at night to lower the pressure. It was a very dangerous practice. Witness added that the tap was very loose; but he had never noticed an escape of gas. A Police Inspector stated that the room in which deceased was found was very small. The Jury returned a verdict of "Death through misadventure."

GAS AND WATER COMPANIES' STOCK AND SHARE LIST.

Referred to on p. 577.

Issue.	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p. c.	GAS COMPANIES.			£ s. d.
590,000	10	Oct. 13	10½	Alliance & Dublin 10 p. c.	22½–23½	..	4 9 4
100,600	10	,,	7½	Do. 7 p. c.	16–17	..	4 8 3
800,000	100	Jan. 3	5	Australian 5 p. c. Deb.	104–106	..	4 14 4
200,000	5	Nov. 11	6	Bombay, Ltd.	6½–7¼	..	4 2 9
40,000	5	,,	6	Do. New, £4 paid	4½–5½	..	4 11 5
880,000	Stk.	Feb. 24	12	Brentford Consolidated	275–280*	..	4 5 9
240,000	,,	,,	9	Do. New	210–215*	..	4 3 9
50,000	,,	,,	5	Do. 5 p. c. Pref.	140–145*	..	3 9 0
159,375	,,	Dec. 15	4	Do. 4 p. c. Deb.	128–133	..	3 0 2
220,000	Stk.	Sept. 15	11½	Brighton & Hove Orig.	267–272	..	4 4 7
296,390	,,	,,	8½	Do. A. Ord. Stk.	197–200	..	4 5 0
973,500	Stk.	Feb. 24	5	Bristol, 5 p. c. max.	125–130*	..	3 16 11
420,000	20	Sept. 29	10	British	48–50	..	4 0 0
50,000	10	Feb. 24	12	Bromley, Ord. 10 p. c.	25–27*	..	4 8 11
75,000	10	,,	9	Do. 7 p. c.	20–22*	..	4 1 10
500,000	10	Oct. 13	6	Buenos Ayres (New) Ltd.	10½–10¾	+¼	5 11 7
220,000	Stk.	Dec. 30	4	Do. 4 p. c. Deb.	100–102	..	3 18 5
150,000	20	July 14	8½	Cagliari, Ltd.	29–30	..	5 10 0
100,000	10	Sept. 29	7	Cape Town & Dis., Ltd.	14–15	..	4 13 4
50,000	50	Nov. 2	6	Do. 6 p. c. 1st Mort.	57–59	..	5 1 8
550,000	Stk.	Oct 13	13½	Commercial Old Stock	312–317	..	4 5 2
200,750	,,	,,	10½	Do. New do.	242–247	..	4 5 0
200,750	,,	Dec. 15	4½	Do. 4½ p. c. Deb.	145–150	..	3 0 0
800,000	Stk.	Dec. 15	10	Continental Union, Ltd.	204–206	+1½	4 17 1
200,000	,,	,,	7	Do. 7 p. c. Pref.	187–192	..	3 13 11
51,600	Stk	Feb. 24	14	Croydon A 10 p. c.	305–310*	..	4 10 4
168,400	,,	,,	11	Do. B 7 p. c.	255–265*	..	4 3 0
555,000	Stk.	Feb. 24	5½	Crystal Palace Ord. 5 p. c.	130–135*	..	3 17 9
60,000	,,	,,	5	Do. 5 p. c. Pref.	140–145*	..	3 9 0
486,090	10	Jan. 27	11	European, Ltd.	23¼–23½	..	4 13 7
354,060	10	,,	11	Do. £7 10s. paid	17–18	..	4 11 9
14,993,075	Stk.	Feb. 10	4 7/10	Gas-light and Coke	4 p. c. Ord.	118–120	+1	4 1 8
2,800,000	,,	,,	3½		3½ p. c. max.	100–102	..	3 8 8
3,749,785	,,	,,	4		4 p. c Con. Pref.	126–128	..	3 2 6
3 843,975	,,	,,	—		3 p. c. Con. Deb.	101–103	..	—
70,000	10	Nov. 11	8	Hongkong & China, Ltd.		13⅞–14½	–½	5 10 4
3,800,000	Stk.	,,	10	Imperial Continental		225–228	–4½	4 7 9
376,400	100	Feb. 1	4	Do. 4 p. c. Deb. Red.		98–101	..	3 19 3
473,600	Stk.	Feb. 10	3½	Do. 3½ p. c. Deb.		102–105	..	3 6 8
75,000	5	Nov. 30	6	Malta & Medn., Ltd.		5–5½	..	5 9 1
560,000	100	Oct. 1	5	Met. of 5 p. c. Deb.		112–114	..	4 7 9
250,000	100	,,	4½	Melbourne 4½ p. c. Deb.		107–109	..	4 2 7
541,920	20	Nov. 11	5	Monte Video, Ltd.		15–16	..	6 5 0
617,946	Stk.	Feb. 24	9½	Newc'tle & Gatesh'd Con.		228–233*	..	3 19 5
264,855	Stk.	Dec. 30	3½	Do. 3½ p. c. Deb.		107–110	..	3 3 8
150,000	5	Nov. 30	8	Oriental, Ltd.		7½–7¾	..	5 3 3
135,000	5	,,	8	Do. New, £4 10s. pd.		6½–6¾	..	5 6 8
15,000	5	,,	8	Do. do. 1879, £1 pd.		1¾–1¾	..	4 11 5
60,000	5	Sept. 29	7	Ottoman, Ltd.		5–5½	..	6 6 2
500,000	100	Dec. 1	6	People's Gas 2nd Mtg. of Chicago Bonds		102–106	..	5 13 2
848,070	10	Oct. 13	6	River Plate Ord.		10–10½	..	5 14 3
250,000	Stk.	Dec. 30	4	Do. 4 p. c. Deb.		102–104	+1	3 16 11
250,000	10	Sept. 29	10	San Paulo, Ltd.		16½–17	+½	5 17 8
135,000	Stk.	Sept. 15	10	Sheffield A.		242–245	..	4 1 8
209,053	,,	,,	10	Do. B.		242–245	..	4 1 8
447,427	,,	,,	10	Do. C.		242–245	..	4 1 8
5,600,000	Stk.	Feb. 10	5⅓	South Metrop., 4 p.c. Ord.		144–147	..	3 12 6
1,460,000	,,	Jan. 13	3	Do. 3 p. c. Deb.		101–103	..	2 18 3
—	—	—	—	Tottenham and A.		—	—	—
—	—	—	—	Edmonton B.		—	—	—
182,380	10	Dec. 30	5	Tuscan, Ltd.		9½–10½	..	4 15 3
149,900	10	Jan. 3	5	Do. 5 p. c. Deb. Red.		99–101	..	4 19 0
				WATER COMPANIES.			
746,184	Stk.	Dec. 30	11	Chelsea, Ord.		320–325	..	3 7 8
150,000	,,	,,	5	Do. 5 p. c. Pref.		168–173	..	2 17 10
160,000	,,	,,	4½	Do. 4½ p. c. Pref. '75		150–155	..	2 19 1
175,785	,,	Sept. 29	4½	Do. 4½ p. c. Deb.		157–162	..	2 15 7
1,720,560	Stk.	Oct. 13	7	East London, Ord.		218–223	..	3 2 9
654,740	,,	Dec. 30	4½	Do. 4½ p. c. Deb.		157–160	..	2 16 3
390,000	,,	,,	3	Do. 3 p. c. Deb.		101–103	..	2 18 3
700,000	50	Dec. 15	7½	Grand 10 p. c. max.		113–115	..	3 5 3
310,000	Stk.	Sept. 29	4	Junction 4 p. c. Deb.		138–143	..	2 15 11
708,000	Stk.	Feb. 10	14	Kent		360–365	..	3 16 9
160,000	,,	,,	7	Do. New, 7 p. c. max.		210–215	..	3 5 1
1,043,800	100	Dec. 30	10½	Lambeth, 10 p. c. max.		298–303	+1	3 9 4
406,200	100	,,	8	Do. 7½ p. c. max.		230–235	..	3 8 1
350,000	Stk.	Sept. 29	4	Do. 4 p. c. Deb.		138–143	..	2 15 11
500,000	100	Feb. 11	13¾	New River, New Shares		433–438	+3	3 2 9
1,000,000	Stk.	Jan. 27	4	Do. 4 p. c. Deb.		137–142	..	2 16 8
902,300	Stk.	June 29	7½	South-wark Ord.		202–207	+4	3 12 6
126,500	100	,,	7½	Do. 7½ p. c. max.		190–195	..	3 16 11
489,200	Stk.	,,	5	and 5 p. c. Pref.		168–171	..	2 18 6
1,019,585	,,	Oct. 13	4	Vauxhall 4 p. c. A Deb.		138–143	..	2 15 11
1,155,066	Stk.	Dec. 15	10	West Middlesex		300–305	..	3 5 7
200,000	,,	,,	4½	Do. 4½ p. c. Deb.		159–162	..	2 15 7
200,000	,,	Sept. 15	3	Do. 3 p. c. Deb.		102–105	..	2 17 2

* Ex div.

Ottoman Gas Company, Limited.—The accounts of this Company, to be presented at the ordinary half-yearly meeting on Tuesday next, show that the gas-rental for the half year ended Dec. 31, amounted to £10,264, and the balance to be dealt with is £4511. The Directors recommend the payment of a dividend at the rate of 7 per cent. per annum on both classes of shares, amounting to £2625, and the transfer of £1000 to the reserve; the balance of £886 to be carried forward. The questions suggested at previous meetings, as to the Company taking powers for electric and other lighting, have been under the consideration of the Board; and the Directors have come to the conclusion that it is advisable to have such powers, in order that the Board may be in a position to protect the Company against competition. With this view, they will propose at an extraordinary general meeting that the Company shall avail themselves of the provisions offered by the Companies (Memorandum of Association) Act, 1890, to enlarge their powers for the purpose of attaining the above-named object, should necessity arise.

The Newtown Water-Works Arbitration.—At a special meeting of the Newtown District Council on the 25th ult., the Water Committee presented their report on the recent arbitration proceedings, reported in another column. In the course thereof, they stated that, though the sum awarded—£27,616—was in excess of the amount estimated by the Council's Engineers, it approximated much more nearly to their figures than to those of the Company. They recommended the Council to give instructions to the Engineer to prepare plans for the necessary new mains, filter-beds, tank, and other works requisite to make the supply of water adequate to meet the needs of the population. The report was unanimously adopted. Several of the members expressed themselves as well satisfied with the result of the arbitration. While admitting that the amount of the award was in excess of their expectations, they felt that they could congratulate themselves on the result.

Reductions in Price.—The price of gas at Llandudno, which has for some time been 3s. 6d. per 1000 cubic feet for lighting, and 3s. per 1000 cubic feet for cooking and heating purposes, has been brought down to the uniform rate of 3s. The Wellington (Salop) Gas Company have decided to reduce their price to 3s. 9d. per 1000 cubic feet, subject to the usual discount, as from Midsummer next. The price of gas at Sevenoaks will be reduced by 1d. per 1000 cubic feet from the 1st prox. The Directors of the Tonbridge Gas Company have granted to the Urban District Council a reduction of 3d per 1000 cubic feet for gas supplied for public lighting (making it 2s. 9d. per 1000 feet); while for that used by the gas-engines at the pumping-station 2s. 6d. will be charged. The Wallasey District Council have reduced the price of gas supplied through prepayment meters from 3s. 7½d. to 3s. 3d. per 1000 cubic feet, and the ordinary supply from 3s. to 2s. 9d. per 1000 cubic feet. The Australian Gaslight Company have reduced their price, as from the commencement of the year, to 4s. per 1000 cubic feet, and the public lamps 5s. and 10s. per annum according to lighting power. The Birchington Parish Council have received notification from the Gas Company that the price of gas will be reduced from 4s. to 3s. 9d. per 1000 cubic feet as from the 25th inst. Should increased consumption result, there is a probability of a further reduction soon.

Water-Works Scheme for Hayfield.—The Hayfield District Council have decided, with the Local Government Board's approval, to construct water-works and supply water to the parish at an estimated cost of £8100. It is reported that the scheme will be strongly opposed.

Incandescent Gas Lighting at Tonbridge.—The Directors of the Tonbridge Gas Company have, free of expense to the District Council, fitted up the High Street with Messrs. James Milne and Son's "New Viaduct" arc lanterns, each furnished with two No. 4 new incandescent burners, at a cost of nearly £100; and the consumption of only one burner—*i.e.*, half the quantity of gas supplied—will be charged. The lamps produce a splendid effect—the street being brilliantly lighted; and great satisfaction is generally expressed at the change.

Are Councillors Disqualified by Giving a Bond?—The agitation which has been carried on for the past three years in connection with the installation of electric lighting at Bangor has culminated in an extraordinary state of matters. It may be remembered that a bond was given guaranteeing the city against any loss from the installation. This bond was signed, among others, by several of the members of the City Council. Legal opinion was obtained to the effect that the bond was a valid one. On the proposal of Mr. David Owen, however, another opinion was secured—viz., that of Mr. Levett, an eminent member of the Equity Bar. His view is that the bond is not a legal instrument. In addition to this, Mr. Owen's Counsel—Mr. Macmorran—while expressing the opinion that the bond is legal, maintains that all those members of the Council who have signed it are thereby *ipso facto* disqualified from being members of the Council. The decision was announced to the Lighting Committee last Thursday. The monthly meeting of the Council is due to-morrow; and Mr. Owen has given notice of his intention to move a resolution to the effect that all the members who have signed the bond, having thereby disqualified themselves from sitting on the Council, should at once withdraw, before they get into further trouble.

The Disposal of Gas Profits at West Bromwich.—At the meeting of the West Bromwich Town Council last Wednesday, the Gas Committee reported that they had informed the Finance Committee that they expected to be in a position to recommend the transference of £2000 out of the profits for the current financial year in aid of the next general district rate. Alderman Rollason, in moving the adoption of the report, remarked that the amount named was £500 more than they had been able to hand over for ten years. Mr. W. H. Keys said, if he remembered rightly, an undertaking was given last year that there should be a material reduction in the charge for gas. The price had been reduced, it was true; but, according to the report, the reduction was not anything like in proportion to what it might have been. He considered it was wrong in principle to help to reduce the rates of non-consumers. This view was supported by Mr. Chesshire and others. Mr. Lawley said the Committee had the impression that they had reduced the price of gas as much as was practicable; but, through excellent management and other things, they had been able to effect considerable saving. They had to act carefully. After further arguments, Alderman Rollason promised that the various points raised should be considered; and the report was adopted.

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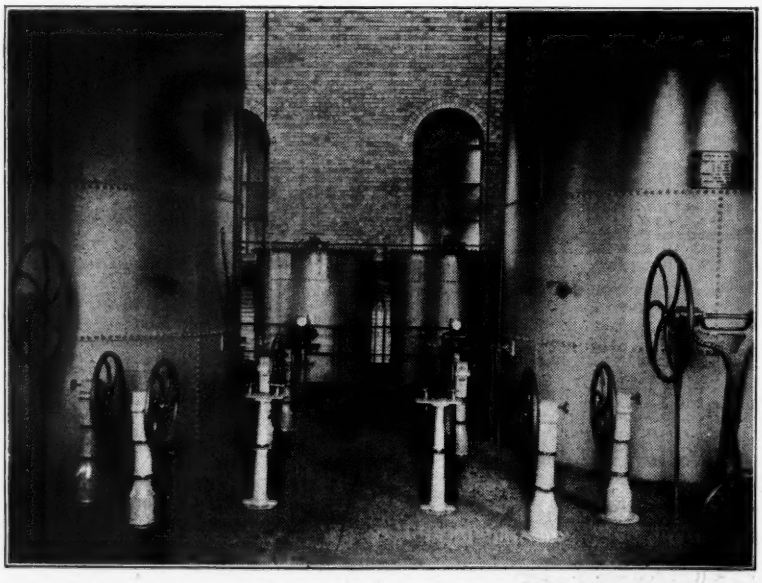

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The Staines Reservoirs Scheme.—The Staines Reservoirs Joint Committee have paid into the Court of Chancery the sum of £19,250, the purchase-money of the land on which the sewage of the town of Staines is at present being treated. It may be remembered that the land has been acquired, not with a view to its utilization for the reservoirs, but in order to avoid any objection that might be raised by reason of a sewage farm being in proximity to one portion of the joint works. The Staines Urban District Council have purchased another site at some considerable distance from the reservoirs; and they are under agreement to give up the land at present in use within nine months from the payment of the purchase-money into Court.

Additional Water for Southborough.—At a recent meeting of the Southborough District Council, the Water Committee submitted a report from their Engineers (Messrs. G. & F. W. Hodson) on the proposed additional works for the supply of water from the Upper Hayesden. They stated that the deep boring of the No. 1 borehole showed evidence of a sufficient supply for the requirements of Southborough, and recommended the sinking of a well 10 feet in diameter. The depth of the sinking was uncertain; but a section of the boring showed that a good bed of gravel occurs 48 feet deep, and overlies a bed of Ashdown sand rock extending between 51 and 68 feet, while another bed of sandstone lies at a depth of from 99 to 108 feet. It was proposed in the first instance to sink the well about 103 feet deep, and commence the headings at the 85-feet level, at an estimated cost of £2500. The Engineers anticipated that in the upper rock or the gravel the required water would be found. The Committee had instructed Messrs. Hodson to prepare the necessary plans and estimates, and recommended the Council to pass the necessary resolution asking the sanction of the Local Government Board for a loan of £4600, to include the cost of the previous trial boreholes. This was done.

Hull Corporation Water Finances and Supply.—In making his annual statement to the Hull Corporation Water Committee last Tuesday, Alderman Massey said they had standing to their credit on March 31, £56,605. This they called their reserve fund, which they had to keep up under the old Act. Their probable profit on the current year's account would be about £8000. But from this the Corporation took £4000, which left the reserve fund at practically £54,605, against which payments had to be made on extension and construction account. These, it was estimated, would on the 31st inst., amount to £15,270; leaving the reserve fund at that date at £39,335. During the financial year ending March 31, 1900, it was estimated that the payments for the same purposes would amount to £27,590; leaving the reserve fund with a balance of £11,745. Taking the profit for the half year ending March 31, 1900, at £8500, less £6000 required by the Finance Committee, the reserve fund at that date would stand at £14,245. The Finance Committee would have to find the money, because the money which they called their own for the purposes of discussion had been spent. It simply existed as a book credit; and the Finance Committee would have to provide the money to redeem their obligations. The Water Engineer (Mr. F. J. Bancroft) reports that the daily average supply of water last year was 9,174,000 gallons—or 39 gallons per head per day for all purposes.

The Redditch District Council and the Gas Company's Bill.—At a special meeting of the Redditch District Council, last Wednesday week, the Lighting Committee presented a report recommending that the Council should oppose the Bill promoted by the Redditch Town and District Gas Company for reorganization and extension of area. The Council desire to secure the insertion in the Bill of clauses for the protection of private consumers. They seek to obtain a reduction in the maximum charge for gas from 4s. 6d. to 4s., and to have the illuminating power increased from 14 to 16 candles. They will also ask that the Company shall be compelled to lay mains in all dedicated streets at the request of the Council; and that the Council shall have the option of purchasing the gas-works at the expiration of ten years. The report was adopted.

The Proposed Purchase of the Felixstowe Water-Works Abandoned by the Council.—The Felixstowe and Walton District Council last Wednesday adopted a report of the Finance Committee to the effect that, having reason to believe that a lower sum than £65,000 would not be taken for the water undertaking, they could not recommend the Council to purchase. The Chairman (Mr. F. W. Mason) put the position clearly before the members. The high price named, he said, would necessitate an average rate-in-aid of about 4d. in the pound over ten years, at the end of which time, at the present rate of increase, new sources of supply would be required. The price had been arrived at by taking the present profits at 33½ years' purchase, and the prospective profits at 25 years' purchase. Other minor reasons influencing the Committee were also stated.

Water-Works and the Factory Act.—On the morning of the 14th ult., George Neller, the Engineer at the Southwold Water-Works, was found entangled in the machinery, and was so mutilated that death resulted. It was supposed that he was oiling the machinery while it was in motion. At the Coroner's inquest, the Inspector of Factories for the district (Mr. C. C. W. Hoare) was present, and stated that water-works had not hitherto been held to come within the definition of factories. He had visited a good many of these works, and on finding the machinery unsafe had pointed out that it would be wise to fence it. The Coroner (Mr. Vulliamy), in summing up, said the question would arise whether there was any liability on the Company under the Factory and Workshops Act. He did not think the building in which the accident occurred could be held to be a factory; but it was certainly a workshop. Water which was filtered came within the definition of the Act; and therefore he held that water-works were a "workshop." Then arose the question of the responsibility of the employer; and the Jury must say whether the machinery was properly fenced. He thought they would be of opinion, as he certainly was, that it was a most dangerous plan for a man to go to oil an engine while it was in motion. All machinery under the Act must be properly fenced; and he held that in this case it was not so. The Jury returned a verdict of "Accidental death," and added a rider to the effect that they wished the machinery might be protected by being boxed over, and that the Directors would allow it to be periodically inspected, and also give instructions that no oiling was to be done while the machinery was in motion.

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The Isle of Wight County Council and the Totland Water-Works.—The Isle of Wight County Council have been in communication with the promoters of the Totland Water Bill with the view to the acquisition of the undertaking; but there is no desire to sell. The Council intend to oppose the Bill, in order to obtain the insertion of a clause providing that, after a certain number of years, the right to purchase should be reserved. The General Purposes Committee are to enter into negotiations with the promoters, and are empowered to agree with them as to the insertion of such clauses and conditions as, in the interests of the inhabitants, they may think most expedient.

The Bridlington District Council Accept the Inevitable.—A special meeting of the Bridlington District Council was held a short time since to consider a resolution by Mr. Mainprize that the whole of the Council form the Water Supply Committee. He said the Council had themselves taken the matter into their own hands by leaving the amount to be fixed for the purchase of the water undertaking with the Arbitrators instead of calling in an umpire. They had only three weeks in which they were supposed to complete the purchase—a time in which they could not now do it; and under the circumstances it was very important that the Council should have the matter in their own hands, and not have to refer it to the Committee. Mr. Sawdon seconded the motion. Mr. Pool could scarcely see the value of the resolution; and Mr. Bradford observed that, after Counsel's opinion, they could not help themselves. Mr. Townsend, the late Chairman of the Water Committee, said the time had arrived when they should do something towards raising the money required by the award. He would shortly have an opportunity of making a statement which would prove to nine out of every ten thinking ratepayers that the price fixed constituted a satisfactory and complete bargain. Mr. Barr was of opinion that they could have purchased the undertaking for £40,000 instead of £70,000, if the Council had been in deadly earnest for the town. The motion was carried.

Local Objectors to the Welsh Water Scheme for London.—Some pertinent figures, lately used at a meeting of the Hereford Town Council, bear upon the attitude of the authorities in that district of the Wye area with regard to the water scheme of the London County Council. According to statistics produced by Mr. Symonds, this scheme extends over more than twice the area appropriated by Birmingham. The Midland capital took 71 square miles; whereas London proposed to take 140 miles. Birmingham took 56 million gallons of water daily; whereas the water proposed to be conveyed to London would amount to 143 million gallons. With regard to compensation water, the quantity allowed by Birmingham was 27 million gallons a day; that allowed by the London scheme, which will take away nearly three times as much water as Birmingham, will only be just over twice this amount. Mr. Symonds urged that the area of the scheme amounted to nearly one-third of the waters of the Wye; and after recent experiences, he doubted very much whether it would prevent disastrous floods. He regarded the scheme with very great misgiving. Another speaker, Mr. Hewitt, held that the average quantity of water taken per day would be no less than 200 million gallons. It was resolved to petition against the scheme.

Gift of Water-Works to a Yorkshire Village.—The Pickering Rural District Council were on Monday last week informed that Mr. J. Gill, of Manchester (owner of the Sutherland Lodge Estate, near Pickering), had, according to promise, paid to the Treasurer £1500 for a scheme of water supply for the village of Cropton. A unanimous vote of thanks was passed to Mr. Gill for his generosity.

The Shelf (Halifax) District Council and the Water-Works.—The Shelf District Council have decided to offer the Water Company the sum of £2500 for their undertaking, against £2750 which the Company have asked. The offer of the Council is understood to be a firm one; but they are willing, as an alternative, to refer the question to arbitration. The shareholders are to meet to consider the offer.

Extraordinary Financial Position of a Water Board.—The Cowlyd Joint Water Board are at present in an unenviable financial position. On March 31, 1897, the constituent authorities owed £3424; on March 31, 1898, £4380. The current expenditure for the year 1897-8 amounted to £3851; whereas the receipts were only £2825. The debts have been accumulating since 1894. The overdraft on the general account is £4317; and the capital has been overdrawn to the amount of £25,598—making a total of £29,915 due to the Treasurer. A rate of 1s. 6d. in the pound over the whole constituent district would, it is estimated, about clear off the indebtedness.

Successful Reduction of Waste of Water at Sudbury.—Dr. J. S. Holden, Medical Officer of Health to the Sudbury Corporation, in his annual report, mentions that in 1897 a serious state of affairs existed in connection with the water supply; it being found necessary, in order to keep up the supply of water, to shut off the flow during the night, owing to excessive leakage—in fact, more water was lost through leakage than was actually used. Early in the past year the Council decided to deal with this very serious position; and the Town Surveyor (Mr. Hayward) took the matter in hand. After an elaborate series of tests, he was able to locate and arrest all the most important sources of leakage, and to reduce a waste of 108,000 gallons per day to about 18,000 gallons. This result has allowed of a continuous supply being maintained throughout the year; and there is now always a three days' supply in hand.

The Public Lighting Question at Windsor.—The vexed question of the public lighting of Windsor has been settled by the acceptance by the Town Council of a tender sent in by the Windsor Electrical Installation Company. The terms are as follows: Ten 2000-candle power arc lamps, at £22 each, £220; eighteen 500-candle ditto, at £16 each, £288; two hundred 16-candle power incandescent lamps, at £3 7s. 6d., £675—total, £1183. It was specified that if the whole scheme were accepted, the price would be £1150. The last tender of the Gas Company was: 245 lamps at £3 12s. 6d., £888 2s. 6d.; four large lamps at £8 10s. each, £34; and one at £8—total, £930 2s. 6d. But they also submitted a scheme for high-power lamps for the principal streets, and incandescent mantles for other portions of the town, at a total cost of £1162 15s. for 11,900-candle power. Under the electric light contract, the town expect to have 32,200-candle power at £12 15s. less cost to the ratepayers.

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Improvements at the Widnes Gas-Works.—The sum of £4200 being required for improvements at the Widnes Gas-Works, and application having been made to the Local Government Board for their sanction to the borrowing of the amount, Colonel Hepper, one of their Inspectors, held a local inquiry into the matter last Thursday. The proposals were explained by the Town Clerk (Mr. H. S. Oppenheim) and the Gas Engineer (Mr. Isaac Carr). Informing the Inspector of the sound financial position of the undertaking, the Town Clerk referred to the low charge for gas, stating that to consumers of more than 3 million cubic feet the price was 1s. 6d. per 1000 feet, less 2d. discount. The profit in 1897-8, after setting aside about £1500 for public lighting, was £2073. The Inspector afterwards visited the works.

The Brierley Hill Gas Company are about to raise additional capital to the extent of £23,120.

The tender of Mr. G. Sant, of Cambridge, has been accepted for the erection of a water-tower for the Luton Water Company for £7085.

The Teignmouth District Council have accepted the tender of Messrs. Westwood and Wrights, of Brierley Hill, for the construction of a new gasholder at £4275.

The Directors of the British Gaslight Company, Limited, recommend a dividend at the rate of 10 per cent. per annum for the half year ended Dec. 31 last, free of income-tax.

The Directors of the Leeds Fireclay Company, Limited, have declared the usual interim dividend on the ordinary shares at the rate of 5 per cent. per annum for the six months ending Dec. 31, 1898.

Messrs. Arden Hill and Co., Limited, have just held successful exhibitions of gas appliances at Woodford and Wanstead; and this week they are holding one at Leytonstone—all under the auspices of the West Ham Gas Company.

Application has been made by Mr. W. R. Clay, of Farnworth, for leave to amend the specification of letters patent No. 17,679 of 1897, for "Improvements in incandescent gas-burners," in accordance with particulars published in the "Illustrated Official Journal" for the 1st inst.

The accounts of the New Incandescent (Sunlight Patent) Gas Lighting Company, Limited, to the 30th of June, 1898, which will be presented at the third ordinary general meeting of shareholders to-morrow, show that there was a loss of £9396 on the twelve months' working.

In deference to a wish recently expressed by the Duke of Westminster, Sir William Richmond has consented to become the first President of the Coal-Smoke Abatement Society. Dr. Des Vœux is the Hon. Treasurer; and Mr. Owen B. Thomas, of 59, Chancery Lane, the Hon. Secretary.

A tube manufacturing company of Philadelphia are making seamless tubes of an aluminium alloy having a thickness of No. 36 gauge, or more, and drawing them over steel tubes with the aid of special machinery. The finished product is said to cost very little more than galvanized iron tubing, and combines all the strength of steel with the advantages of aluminium.

The Gas Committee of the West Bromwich Corporation have accepted a tender of Mr. G. K. Harrison, of Stourbridge, for the supply of retorts, fire-bricks, &c., for alterations of retort-benches.

A sum of £5000 is being contributed by the Patent Nut and Bolt Company, Limited, Birmingham, to the fund now being raised for the establishment of a University in the city. The contribution is made subject to certain terms and conditions to be hereafter agreed upon. One idea in the minds of the Directors as to the benefits they are to derive is the establishment of an independent chair for teaching mechanical engineering in the highest sense of the term.

In the First Division of the Court of Session a few days ago, a petition in which the Rosewell Gas Coal Company, Limited, of 21, St. Andrew Square, Edinburgh, asked authority to reduce the capital from £40,000 to £22,500 was granted. The reduction has been rendered necessary by the gas coal in one of the mineral fields in Fifeshire having become exhausted, and the field having been abandoned, so that the value of the property and assets have become diminished.

The Secretary of State for Foreign Affairs has received a dispatch from Her Majesty's Consul-General at Christiania, stating that tenders are invited by the Manager of the Christiania Gas-Works for the delivery of 30,000 tons of New Pelton, Old Pelton, Londonderry, Pelaw Main, or Benwell gas coal. The conditions of tender, with full particulars, may be examined on personal application at the Commercial Department of the Foreign Office any day between the hours of 11 a.m. and 5 p.m. The final date for the reception of tenders is the 16th inst.

The profit of Messrs. John Wright and Co., Limited, for the past year, after further strengthening the internal reserves and charging debenture interest, Directors' fees, and the Managing-Directors' salaries and commission, amounts to £18,521. After adding the balance brought forward, and deducting the interim dividend paid in July, there remains £18,499, which the Directors recommend should be used in paying dividends at the rates of 6 and 10 per cent. per annum for the past half year on the preference and ordinary shares, giving a bonus of 5s. per share on the latter shares, placing £5000 to the reserve (raising the fund to £10,000), and carrying forward £5759. Surplus funds to the amount of £2567 were invested during the year—£2271 in debentures of the Company, and £296 in first-class securities.

According to the "Financial News," the Canadian Imperial Oil Company are understood to be the Canadian end of the great Standard Oil Trust of the United States, and some attention has been attracted to the situation arising from the absorption of the Bushnell Oil Company and the Eastern Oil Company—two Canadian concerns—by the Imperial Oil Company. The Eastern Oil Company formerly controlled the oil trade in the Maritime Provinces. To effect the arrangement referred to, the Imperial Company were recently granted a new Charter, and their stock increased from $500,000 to $1,000,000. This enabled the Imperial Company to practically secure a monopoly of the oil business of Canada. The refining and manufacturing at Petrolea and Sarnia will in future be done by the new Trust, which will also deal direct with the trade.

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[For Illustrated Advertisement, see p. 622.]

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JOHN NICHOLSON & SONS, Limited, Chemical Works, Leeds, specially produce this ACID from SULPHUR, for making SULPHATE OF AMMONIA of high quality and *good* colour. Delivery in our own Railway Tank-Wagons or Carboys. Highest references and all particulars supplied on application.

HYDRATED OXIDE OF IRON.
PREPARED from Pure Iron.
Twice as Rich as Bog Ore.
Gives no Back Pressure.
The Cheapest in the Market.
Can be Lent on Hire.
Can be Exchanged for Spent Oxide.
READ HOLLIDAY AND SONS, LTD., HUDDERSFIELD.

SADLER & CO., Ld., Middlesbrough; ULVERSTON (BARROW); PORTSMOUTH; CARLTON (N.E.R.); and STOCKTON. Tar and Petroleum Distillers. Benzol and Petroleum Spirit, 700 and other Gravities specially prepared for Carburetting. SOLAR OIL for Gas Making, Kerosene, &c.
Correspondence invited.
Telegraphic Address: "SADLER, MIDDLESBROUGH."

TO GAS AND WATER OFFICIALS.
CYCLES of the Highest Quality at reasonable Prices. Catalogue, post free. For CASH, or on GRADUAL PAYMENT SYSTEM. *Sent on approval. Twelve Months' Guarantee.*
MELROSE CYCLE COMPANY, COVENTRY.

WANTED, a Situation by a young Man as METER INSPECTOR and GAS-FITTER. Can fix Meters and Stoves. Well up in Iron and Compo. Age 22. Testimonials to be had.
Apply to W. K., care of Mr. H. Keirman, Manager, Gas-Works, THORNEY, near PETERBOROUGH.

YOUNG Man (Age 27) wants Situation as MANAGER or SECRETARY (or both combined) of a medium-sized Gas or Water Works, or ASSISTANT in a large Works. Thirteen Years' experience; last Five Years as Assistant Manager and Secretary of a medium-sized Works.
Address No. 3224, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

GAS Manager required immediately for the Holsworthy Gas-Works.
Apply to the SECRETARY.

GAS-STOVES.
WANTED, a good Traveller, to take charge of London and South Grounds.
Apply to CHAS. WILSON AND SONS, Armley, Leeds.

WANTED, by a Merchant Firm, a TRAVELLER in Gas Coal and Cannel. Good Salary and Expenses.
Address No. 3211, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, a good steady Man, used to Shovel Charging and Exhauster and Engine. Wages 27s. all the year round. State whether Married or Single.
Apply to the MANAGER, Gas-Works, Ware, HERTS.

WANTED, for a small Works, a steady, reliable Man as STOKER. Used to Engine and Exhauster, and who would make himself generally useful. Wages 24s. per week, with House, Coal, Gas, and large Garden. Permanency.
Apply to the MANAGER, Gas-Works, BROWNHILLS, near WALSALL.

WINCHESTER WATER AND GAS COMPANY.

GAS AND WATER FITTINGS DEPARTMENT.
WANTED, an Assistant (good address), to take charge of Show-Room, and direct Fitters under Manager's supervision.
Applications, stating Age, whether married or single, Experience, and Salary, with *copies* of Testimonials, at once to FREDERICK G. DEXTER, Engineer and Manager, Water and Gas Company, WINCHESTER.

CORPORATION OF STOKE-UPON-TRENT.
(GAS DEPARTMENT.)
WANTED, a Clerk with a good knowledge of Gas-Works routine. Salary 30s. per week.
Applications, stating Age and Experience, with *copies* of Three recent Testimonials (which will not be returned) to be sent to the Mayor, F. Geen, Esq., Stoke-upon-Trent, not later than Thursday, the 9th of March, 1899.
Canvassing will be considered a disqualification.

GAS PURIFICATION.

OXIDE OF IRON BOG ORE.
BALE & CO.'S Oxide of uniform quality.
SPECIAL FIRE CEMENT, OXIDE PAINTS, OILS, SULPHURIC ACID, &c.
120 and 121, NEWGATE STREET, LONDON, E.C.
Telegrams: "BOGORE, LONDON."

SPENT OXIDE wanted.
BROTHERTON AND CO., Chemical Manufacturers' Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

RETORT SETTER WANTED.
PERMANENT Employment to competent Man.
Apply, by letter, giving References, to the MANAGER, Gas-Works, ROCHDALE.

WANTED, a thoroughly good, steady Man as leading STOKER for day and night shifts. Must be a good Carbonizer, able to control Men, and to look after Engines, Exhausters, Boilers, &c. Wages 36s. per week.
Send References to T. WEBB, Gas-Works, EGHAM.

WANTED, a thoroughly good, steady, experienced Man to DRIVE a STEAM-CRANE with Grab for unloading Coals, also to look after other Machinery, Boilers, &c. None but good Practical Men need apply. Wages 35s. per week.
Send References to T. WEBB, Gas-Works, EGHAM.

WANTED, for Chemical Works, a young Man (not under 30), having good knowledge of Book-keeping, and able to take entire charge of the Commercial Work. One used to the Chemical Trade preferred. Applications will be considered strictly confidential.
Apply, by letter, to No. 3223, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

GUILDFORD GASLIGHT AND COKE COMPANY.
WANTED, immediately, a Practical Man to work Schwab's Sulphate Plant and make himself useful in Gas-Works. Wages 30s. per week.
Apply at once with two recent Testimonials.
WILLIAM TITLEY,
Secretary.
Gas Offices, Guildford,
March 4, 1899.

WANTED, two Second-hand (15 or 16 feet), PURIFIERS. Good condition.
DUXBURY AND CO., 16, Deansgate, MANCHESTER.

WANTED, thirty Street Lamps (Second-hand) in good Condition.
Price and Particulars to No. 3221, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

URBAN DISTRICT COUNCIL OF PADIHAM.

TO GAS COMPANIES & LOCAL AUTHORITIES.
THE Gas Committee of the above District Council are desirous of purchasing Two SECOND-HAND PURIFIERS, 14 feet square, with Valves, Covers, and Lifting Gear all complete, and in good condition.
Gas Companies and Local Authorities making Extensions may send Particulars to the undersigned, with offers of the disused Plant.
J. R. SMITH,
Clerk to the District Council.
District Council Offices,
Padiham, Feb. 23, 1899.

GAS-WORKS FOR SALE.
FOR SALE—Two small Gas-Works in Country Towns, together or singly.
For Particulars, apply to EDMUNDSONS, 33, Capel Street, DUBLIN.

FOR SALE—A Gas Exhauster, capable of passing 100,000 cubic feet per hour; also 12-Horse Power VERTICAL STEAM-ENGINE, by Easton. Cheap.
Address No. 3222, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

FOR SALE—A good sound Washer, cheap, "Cockey's" Patent, capacity 150,000 cubic feet per diem, with Cockey's Four-Way Valve and 6-inch Connections. The whole is in good working order, and can be seen in action.
Price and Particulars from STEPHEN TEMBLETT, Gas Offices, ANDOVER.

GAS Plant for Sale, cheap to clear—
RETORT IRONWORK, several good Sets.
8½-inch VERTICAL PIPE CONDENSER complete.
Four ANNULAR CONDENSERS, 32 in. by 18 ft.
EXHAUSTERS and ENGINES, several good Sets.
TOWER SCRUBBERS, 5ft. by 20ft., 5ft. by 40ft., & others.
PURIFIERS from 5 ft. square to 12 ft. square.
STATION METERS and GOVERNORS.
GASHOLDERS, 35 ft. by 14 ft. & 50 ft. by 18 ft., perfect.
VALVES of all kinds in Stock.
IRON STORAGE TANKS.
J. FIRTH BLAKELEY & Co., Thornhill, DEWSBURY.

FOR SALE—One 10,000 Cubic Feet per hour ANDERSON STEAM ENGINE and EXHAUSTER combined, with additional Appliances and Connections for Pumping Water and other purposes. The whole are in excellent working condition. Price £25.

Apply to ROBERT DARNEY, Gas-Works, FAVERSHAM.

GAS PLANT for Sale—I can always offer NEW and SECOND-HAND GAS APPARATUS, including Retorts and Fittings, Condensers, Exhausters, Scrubbers, Washers, Purifiers, Gasholders, Tanks, Valves, Connections, &c. Also a few COMPLETE WORKS. Compare Prices and Particulars before ordering elsewhere.

J. F. BLAKELEY, Gas Engineer, Thornhill, DEWSBURY.

FOR SALE, cheap—

Two PURIFIERS, 8 ft. square by 4 ft. deep.
Two " 5 ft. " 4 ft. "
One " 5 ft. " 3 ft. "
One EXHAUSTER, 20,000 Cubic Feet per hour.
Two " 5000 " " "
Also CONDENSERS, SCRUBBERS, WASHERS, GASHOLDERS and TANKS, VALVES, &c., &c.

Apply to SAML. WHILE AND SON, 60, Queen Victoria Street, LONDON, E.C.

FOR SALE.

THE Directors of the Staines and Egham Gas Company have FOR SALE a 10-inch HORIZONTAL CONDENSER, a LIVESEY WASHER, a GOOD'S WASHER, a CAST-IRON SCRUBBER, 8 ft. by 24 ft.—the whole complete, with 10-inch Connections, Valves, &c. They are capable of dealing with 500,000 cubic feet of Gas in 24 hours. All in good condition, and can be removed at once. The whole to be taken down and carted from the Company's Works by the Purchaser.

Tenders for the whole as they stand to be sent to the undersigned.

THOMAS WEBB,
Manager.

SECOND-HAND GAS PLANT FOR SALE.

ONE Kirkham & Hulett "Standard" WASHER-SCRUBBER, fitted with Wooden Bundles. Capacity 150,000 cubic feet per day, 8-inch Connections diminished to 6-inch with Bye-pass and Valves, Draw-Off Cocks, and Driving Gear. The whole complete, and in thorough working order.

Also One ANDERSON'S COMBINED ENGINE and EXHAUSTER, Capacity 150,000 cubic feet per day, with 6-inch Connections and Bye-Pass; and One DITTO, 300,000 cubic feet Capacity, with 10-inch Connections and Bye-Pass.

For further Particulars, apply to the MANAGER, Gas-Works, NEWMARKET.

TENDERS FOR GAS-METERS.

TENDERS wanted for the Supply and Repair of GAS-METERS, including their setting-up and exchange, for the lighting of Copenhagen, Denmark.

Particulars as to Conditions can be obtained every week-day from Ten to Four o'clock, through the Koebenhavn Gasvaerkers Ingenieurkontor, Vestre Gasvaerk, Koebenhavn V.

Tenders, by letter, with the words "Tilbud paa Gasmaalere," should be addressed Magistrats-Kontor, 4, Abthell, Lavendelstraede 1, Copenhagen K, till Wednesday, March 15, 1899, Twelve o'clock at noon.

THE MAGISTRATE OF KOPENHAGEN.

Feb. 17, 1899.

TENDERS FOR TAR.

THE Directors of the Exeter Gaslight and Coke Company invite TENDERS for their surplus TAR for Six Months from Ladyday next; the Company to have the option to extend same a further Six Months.

Delivery on Company's Works, filled into Purchaser's Tanks.

Payments, cash monthly.

Sealed Tenders, endorsed "Tender for Tar," will be received by the undersigned on or before Saturday, the 25th of March next; but the Directors do not bind themselves to accept the highest or any Tender.

By order,
W. A. PADFIELD,
Secretary.

Gas Offices: 11 & 12, East Southernhay, Exeter, March 1, 1899.

BRISTOL WATER-WORKS.

YEO PUMPING-STATION.
EXTENSION OF TIME.

THE Directors of the Bristol Water- Works Company are desirous to receive TENDERS for two Pairs of STEAM COMPOUND ROTATIVE BEAM PUMPING-ENGINES, six LANCASHIRE BOILERS, fitted with MECHANICAL STOKERS, two FUEL ECONOMIZERS, and other MACHINERY and APPARATUS, erected complete at their Yeo Pumping-Station, situate at Blagdon, in the County of Somerset.

Drawings may be inspected, and Specifications and Forms of Tender may be obtained, at the Office of the Clerk of Works, Yeo Reservoir, Blagdon, Somerset, and at the Office of Messrs. T. & C. Hawksley, Civil Engineers, No. 30, Great George Street, Westminster, S.W., on payment of Two Guineas (to be returned if a *bonâ-fide* Tender be made), on and after Saturday, the 18th inst.; and Tenders must be delivered at the Office of the Company at or before Ten o'clock in the forenoon of Saturday, the 25th of March next.

The Company do not pledge themselves to accept the lowest or other Tender.

ALFRED J. ALEXANDER,
Secretary and General Manager.

Bristol, February, 1899.

NOTE.—Uncoloured Photographic Copies of certain of the Drawings may be obtained on application to Messrs. T. & C. Hawksley, on payment of the Photographer's charge therefor.

TENDERS FOR GAS COAL.

THE Directors of the Windsor Royal Gaslight Company invite TENDERS for 9500 Tons of High-Class GAS COAL, with option of taking 100 Tons per month in addition, to be delivered free to the Great Western Railway Station at Windsor during the Twelve Months ending the 30th of April, 1900.

Deliveries to be made in such quantities and at such times as may be required by the Company.

Sealed Tenders, endorsed "Tender for Coal," to be sent by post to reach the undersigned by Tuesday morning, the 4th of April. Forms of Tender not supplied.

The Directors do not bind themselves to accept any Tender.

By order,
JOHN HENRY STRANGE,
Secretary.

15, Victoria Street, Windsor, Berks, Feb. 21, 1899.

RHONDDA URBAN DISTRICT COUNCIL.
(GAS AND WATER DEPARTMENT.)

THE above Council are prepared to receive TENDERS for the supply of LIME, SULPHURIC ACID, FIRE-BRICKS, WROUGHT-IRON TUBES, GAS AND WATER FITTINGS, OIL AND PAINT, IRONMONGERY, LEAD PIPE, STATIONERY, &c., as may be required for the half year ending the 30th of September, 1899.

Further Particulars and Forms of Tender may be obtained on application to the Engineer, Mr. Octavius Thomas, Gas and Water Offices, Pentre, R.S.O., Glam.

No Form of Tender other than that issued by the Committee will be accepted.

Tenders, endorsed "Contract 1, 2, &c.," as the case may be, addressed to the Chairman of the Gas and Water Committee, to be sent to the undersigned on or before Thursday, the 16th inst.

The Committee do not bind themselves to accept the lowest or any Tender.

WALTER H. MORGAN,
Clerk.

Council Offices, Pentre, R.S.O., Glam., March 4, 1899.

CITY OF LEEDS.
(GAS DEPARTMENT.)

TENDERS FOR DRY GAS-METERS.

THE Gas Committee of the Leeds City Council are prepared to receive TENDERS for the supply of DRY GAS-METERS, to be delivered at their Meter-Stores during a period of Twelve Months from receipt of order.

Each party tendering is required to send, on or before Monday, the 13th inst., two sample three-light Meters (one of which is to be open for examination), addressed to the Gas-Meter Works, Meadow Lane, Leeds.

Forms of Tender may be obtained on application to the undersigned, at the Offices of the Gas Department, Municipal Buildings, Leeds.

Endorsed Tenders, addressed to the Chairman of the Gas Committee, at the latter address, will be received not later than Tuesday, the 21st inst.

The Committee do not bind themselves to accept the lowest or any Tender.

R. H. TOWNSLEY,
General Manager.

Municipal Buildings, Leeds, March 4, 1899.

COUNTY BOROUGH OF BURY.

THE Gas Committee invite Tenders for the following Contracts, namely:—

CONTRACT No. 1—For the Supply, Delivery, and Erection of New ROOFS, PURIFIERS, VALVES, CONNECTIONS, &c., complete.

CONTRACT No. 2—BRICKWORK for Alterations to the present Purifying-House.

Plans may be seen and Specification, Conditions, Schedule of Quantities, and Forms of Tender, obtained on and after March 15 next, on payment of—

Contract No. 1—£3 3s.
Contract No. 2—£1 1s.

(which will be returned upon receipt of *bonâ-fide* Tender), on application to Mr. H. Simmonds, Engineer and Manager, Gas-Works, Elton, Bury.

Tenders will not be considered unless made out on the Forms of Tender prescribed.

Sealed Tenders, endorsed "Contract No. 1" or "Contract No. 2," as the case may be, addressed to the undersigned, must be delivered at the Corporation Offices, Bank Street, Bury, on or before April 5, 1899.

JOHN HASLAM,
Town Clerk.

Corporation Offices, Bank Street, Bury.

SHEFFIELD UNITED GASLIGHT COMPANY.

ELEVATED TRAMWAY AND COKE-STORE.
TO ROOF AND GIRDER MANUFACTURERS, CONTRACTORS, &c.

THE Directors of this Company invite TENDERS for the supply and erection of CORRUGATED-IRON ROOFS, with Columns, Girders, and Cast-Iron Guttering, and for ELEVATED TRAMWAY for their Grimesthorpe Station.

The Roofing is 96 feet long by 88 feet span, and the Elevated Tramway 650 feet long.

Drawings may be seen, and Specification with Bill of Quantities and Form of Tender obtained, on application to the Engineer, Mr. Fletcher W. Stevenson, on payment of 10s. 6d., which will be returned on receipt of a *bonâ-fide* Tender.

Sealed Tender, endorsed "Tender for Coke-Store," must be delivered by post to the undersigned at the Company's Offices not later than the first post on Saturday, the 18th day of March next.

The Directors do not bind themselves to accept the lowest or any Tender.

HANBURY THOMAS,
General Manager and Secretary.

Commercial Street, Sheffield, March 2, 1899.

TENDERS FOR GAS COAL.

THE Corporation Gas Committee of Stoke-upon-Trent invite TENDERS for the supply of GAS COAL.

Specification and Form of Tender may be obtained on application to the undersigned, or at the Gas Offices.

Tenders to be sent in not later than Twelve o'clock noon, the 16th of March, 1899, addressed F. Geen, Esq., J.P., Chairman of the Gas Committee, Stoke-upon-Trent, and endorsed "Tender for Gas Coal."

WM. PRINCE,
Engineer and Manager.

Gas-Works, Stoke-upon-Trent.

AYR GAS COMPANY, LIMITED.

THE Directors invite Tenders for the supply during the Year from the 31st of March inst., of 6000 Tons of second-class CANNEL COAL, and 2000 Tons of GAS SPLINT COAL, Free on Rail, at Ayr Railway Station.

Sealed Tenders, marked "Tender for Coal," and giving Name, Analysis, and Quantity of Coal offered, to be lodged with the Subscriber, not later than the 16th of March inst.

WILLIAM J. POLLOCK,
Secretary.

24, Sandgate, Ayr, March 2, 1899.

COUNTY BOROUGH OF SALFORD.
(GAS DEPARTMENT.)

THE Gas Committee invite Tenders for the supply of FIRE-BRICKS, RETORTS, &c., for their various Works.

Full Particulars may be obtained on application to the Gas Engineer, Gas Offices, Bloom Street, Salford.

Sealed Tenders, endorsed "Tender for Fire-Clay Goods," addressed to the Chairman of the Gas Committee, Town Hall, Salford, to be delivered to me not later than Three p.m. on Wednesday, the 15th inst.

By order,
SAM. BROWN,
Town Clerk.

Town Hall, Salford, March 1, 1899.

LANCASTER CORPORATION GAS-WORKS.

THE Lancaster Corporation Gas Com- mittee invite TENDERS for the purchase of about 250 Tons of SPENT PURIFYING MATERIAL, delivered on rails, Lancaster.

Samples of the Spent Material may be obtained on application to the undersigned, from whom any further Information may be obtained.

Sealed Tenders, endorsed "Tender for Spent Purifying Material," to be delivered to T. C. Hughes, Esq., Town Clerk, Lancaster, not later than Saturday, March 18 next.

C. ARMITAGE,
Manager.

March 4, 1899.

THE Corporation of Middleton are pre- pared to receive TENDERS for the WET and DRY GAS-METERS, TUBES and FITTINGS, SULPHURIC ACID, and LIME required at their Gas-Works during the ensuing Twelve Months.

Further Particulars and Form of Tender may be obtained from Mr. T. Duxbury, Gas Manager.

Tenders, addressed to the Chairman of the Gas Committee, to be delivered at my Office on or before Wednesday, the 15th of March, 1899, endorsed "Tender for Meters" or "Tubes," &c., as the case may be.

The Corporation do not bind themselves to accept the lowest or any Tender.

FREDERICK ENTWISTLE,
Town Clerk.

Town Hall, Middleton, March 2, 1899.

URBAN DISTRICT COUNCIL OF NEWTON-IN-MAKERFIELD.

TENDERS FOR CONDENSERS AND EXHAUSTER.

THE above Council invite Tenders for the supply and erection of CONDENSERS and EXHAUSTER at their Gas-Works (Earlestown, L. & N.W. Railway).

Further Particulars and Forms of Tender may be obtained upon application to Mr. A. Bowes, Assoc.M. Inst.C.E., Town Hall, Earlestown.

Tenders, endorsed "Condensers" or "Exhauster," to be forwarded to the undersigned not later than Saturday, the 18th of March, 1899.

The lowest or any Tender not necessarily accepted.

W. W. SHIRLEY,
Clerk to the Council.

Town Hall, Earlestown, Lancashire, March 1, 1899.

TODMORDEN CORPORATION.
(GAS DEPARTMENT.)

TO RETORT & FIRE-BRICK MANUFACTURERS.

THE Gas Committee of the above Cor- poration are prepared to receive TENDERS for the supply of the necessary (Inclined and Horizontal) RETORTS, FIRE-BRICKS, FIRE-CLAY, &c., required by them during Twelve Months ending March 31, 1900. Also for the necessary RETORT SETTING required during same period.

Full Particulars and Form of Tender may be had on application to the Engineer, Mr. H. Hawkins, Gas-Works, Todmorden.

Tenders, to be endorsed "Tender for Retorts, &c.," to be addressed to the Chairman, Gas Committee, Town Clerk's Office, Town Hall, Todmorden, not later than the 30th of March, 1899.

The Corporation do not bind themselves to accept the lowest or any Tender.

By order,
H. HAWKINS,
Engineer and Manager.

TOWN AND COUNTY OF POOLE GAS AND COKE COMPANY, LIMITED.

THE Directors of the above Company hereby invite TENDERS for the supply and delivery at the Gas Quay or the Railway Station, Poole, of the following quantities of TURNED and BORED SPIGOT and SOCKET CAST-IRON PIPES—

Each.	Cwt.	qr.	lbs.		
400	5 in.	1	3	9, and 9 ft. Exclusive of Socket.	
1000	4 in.	1	1	9, „ 9 ft.	„ „
1000	3 in.		3	23, „ 9 ft.	„ „
600	2 in.		1	19, „ 6 ft.	„ „

Also a quantity of SPECIAL CASTINGS for the various sizes. The whole to be supplied in accordance with the Specification, which may be seen at the said Company's Offices, Gas Quay, Poole.

Tenders, sealed and endorsed "Tender for Pipes," must be delivered to the undersigned on or before Monday, the 27th inst.

The said Directors do not bind themselves to accept the lowest or any Tender.

By order,
WILLIAM DAVIS,
Secretary, &c.

BRITISH GASLIGHT COMPANY, LIMITED.

NOTICE is Hereby Given, that the HALF-YEARLY ORDINARY GENERAL MEETING of the Proprietors of this Company will be held at this Office on Wednesday, the 22nd inst., at Half-past Twelve o'clock precisely, to transact the usual Business, and to declare the Dividend for the Half Year ended the 31st of December last.

Notice is Hereby also Given, that the TRANSFER BOOKS of the Company WILL BE CLOSED on the 11th, and RE-OPENED on the 23rd inst.

By order of the Court of Directors,
H. B. CHAMBERLAIN,
Secretary.

Chief Office: No. 11, George Yard, Lombard Street, London, E.C.,
March 3, 1899.

OTTOMAN GAS COMPANY, LIMITED.

NOTICE is Hereby Given, that the ORDINARY GENERAL MEETING of the Shareholders in the above Company will be held at the Offices of the Company, 9, Queen Street Place, Cannon Street, E.C., on Tuesday, March 14, 1899, at One o'clock in the Afternoon precisely, to receive the Report of the Directors and the Accounts for the Half Year ended the 31st of December last, to declare a Dividend, to elect a Director and Auditors, and to transact the General Business of the Company.

The TRANSFER BOOKS WILL BE CLOSED from March 7 to 14, both days inclusive.

By order of the Board,
THOMAS GUYATT,
Secretary.

9, Queen Street Place, Cannon Street, London, E.C., Feb. 28, 1899.

EAST LONDON WATER-WORKS COMPANY.

NOTICE is Hereby Given, that the HALF-YEARLY GENERAL ASSEMBLY of Proprietors will be held at the Company's Offices, St. Helen's Place, Bishopsgate Street, E.C., on Thursday, the 30th of March, 1899, at Twelve o'clock noon precisely.

The TRANSFER BOOKS in respect of the ORDINARY STOCK WILL BE CLOSED from the 23rd of March inst. to the 12th of April inclusive, and RE-OPENED on the 13th of April, on which day the Dividends on this Stock will be payable.

By order,
I. A. CROOKENDEN,
Secretary.

St. Helen's Place, Bishopsgate Street, E.C., March 3, 1899.

Foolscap 4to, pp. 535, with 239 Illustrations and Steel Plate Engraving (as Frontispiece) of WILLIAM MURDOCH, *Inventor of Gas Lighting. Morocco Gilt, 21s.; Roan Gilt, 18s.*

THE SIXTH (AND CENTENARY) EDITION
OF THE
HANDBOOK
FOR
GAS ENGINEERS
AND MANAGERS.
BY
THOMAS NEWBIGGING,
M.Inst.C.E.

LONDON:
WALTER KING, 11, BOLT COURT, FLEET STREET, E.C.

PATENTS, DESIGNS, AND TRADE MARKS ACT, 1883 TO 1888.

NOTICE is Hereby Given, that William Richard Clay, of 137, Rawson Street, Farnworth, near Bolton, in the County of Lancaster, has applied for LEAVE TO AMEND THE SPECIFICATION OF THE LETTERS PATENT No. 17,679, of 1897, for "Improvements in Incandescent Gas-Burners."

Particulars of the proposed Amendments were set forth in the "Illustrated Official Journal (Patents)" issued on the 1st of March, 1899.

Any person or persons may give Notice of Opposition to the Amendment (on Form G), at the Patent Office, 25, Southampton Buildings, London, W.C., within One Calendar Month from the date of the said "Journal."

(Signed) C. N. DALTON,
Comptroller-General.

C. F. ENNIS,
31, Haselrigge Road, Clapham, S.W.,
Agent for Applicant.

BROMLEY GAS CONSUMERS' COMPANY.

SALE BY AUCTION OF 400 ORDINARY SHARES OF £10 EACH.

THE Directors give Notice that they have instructed Messrs. Baxter, Payne, & Lepper, to SELL BY AUCTION, at the Bell Hotel, Bromley, Kent, on Thursday, the 23rd of March, 1899, at Eight o'clock p.m. precisely,

400 ORDINARY SHARES OF £10 EACH,

in the Bromley Gas Consumers' Company, in Lots of Five and Ten Shares.

The Dividend on similar Shares since the Year 1891, which has been at the rate of £8 10s. per cent., is now 9 per cent.

Particulars and Conditions of Sale may be obtained of the SECRETARY of the Company; and of BAXTER, PAYNE, AND LEPPER, Auctioneers and Land Agents, Market Square, Bromley, Kent, and 69, King William Street, E.C.

By order,
HENRY WILLIAM AMOS,
Secretary.

Bromley, Kent,
February, 1899.

THE Acetylene Illuminating Company, Limited, 63, Queen Victoria Street, London, E.C., GIVE NOTICE that they hold the BRITISH PATENT RIGHTS for the MANUFACTURE OF CALCIUM CARBIDE by means of the electric furnace, that they are bringing an action against the Midland Acetylene (Parent) Syndicate, Limited, to restrain them from so manufacturing that product, and that they intend in the future to bring actions against all infringers of these Patents and all purchasers or users of Carbide of Calcium made in infringement of the same.

NOTICE.

THE Acetylene Illuminating Company, Limited, having published and issued an advertisement or circular claiming that they hold the British Patents for the Manufacture of Calcium Carbide by means of the Electric Furnace, we guarantee to indemnify anyone who buys Carbide from us against any claim by "The Acetylene Illuminating Company, Limited," or anyone else.

READ HOLLIDAY AND SONS, LIMITED, Acetylene Gas Engineers and Carbide of Calcium Manufacturers, HUDDERSFIELD.

NOTICE.

THE Acetylene Illuminating Company, Limited, having published and issued an advertisement or circular claiming that they hold the British Patents for the Manufacture of Calcium Carbide by means of the Electric Furnace, we guarantee to indemnify anyone who buys Carbide from us against any claim by "The Acetylene Illuminating Company, Limited," or anyone else.

TINKER AND HOLLIDAY, LIMITED, Carbide of Calcium Manufacturers, HAZELHEAD, SHEFFIELD.

TUBES AND FITTINGS
ALL KINDS
WRITE FOR PRICES
STAFFORDSHIRE TUBE Co, BIRMINGHAM.

SAN PAULO GAS COMPANY, LIMITED.

NOTICE OF REMOVAL.

NOTICE is Hereby Given, that, on the 13th of March, the Offices of the Company WILL BE REMOVED to Nos. 1 to 4, BROAD STREET HOUSE (First Floor), NEW BROAD STREET, LONDON, E.C.

By order,
G. H. ROGERS,
Secretary.

1, Pinners' Hall, Old Broad Street, London, E.C., March 2, 1899.

SALES BY AUCTION OF GAS AND WATER STOCKS AND SHARES.

MR. ALFRED RICHARDS begs to notify that his AUCTIONS of STOCKS and SHARES in London, Suburban, and Provincial Gas and Water Companies are held MONTHLY, at the Mart, Tokenhouse Yard, E.C.

He also undertakes the issuing by Auction of Gas and Water Stocks and Shares under Parliamentary Powers.

Terms for issuing such Capital, and also for including Gas and Water Stocks and Shares in these periodical Sales, can be obtained on application at Mr. Alfred Richards's Offices, 18, FINSBURY CIRCUS, E.C.

By order of the Directors of the
LEA BRIDGE DISTRICT GAS COMPANY.

£6C00
FOUR PER CENT. PERPETUAL DEBENTURE STOCK
AND
1200 £10 SHARES.

Or such less number as will produce, including Premium, the sum of £19,333. The Shares rank for a Standard Dividend of 7 per cent., subject to the Sliding-Scale; the last Dividend on similar Shares in the Company having been at the rate of 8 per cent.

MR. ALFRED RICHARDS will Sell THE ABOVE BY AUCTION, at the Mart, E.C., on Tuesday, the 14th of March, at Two o'clock, in Lots.

Particulars of the SECRETARY of the Company, 3 Jeffreys Square, ST. MARY AXE, E.C.; and of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C.

By order of the Directors of the
SOUTHEND GAS COMPANY.

£3250 of FOUR PER CENT. PERPETUAL DEBENTURE STOCK.

MR. ALFRED RICHARDS will Sell THE ABOVE BY AUCTION, at the Mart, Tokenhouse Yard, E.C., on Wednesday, March 22, at Two o'clock, in Lots.

Particulars of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C.

By order of the Executors of the late Alfred Hammond, Esq., and other Owners.

IMPORTANT SALE OF GAS AND WATER STOCKS AND SHARES.

MR. ALFRED RICHARDS will Sell BY AUCTION, at the Mart, Tokenhouse Yard, E.C., on Wednesday, March 22, at Two o'clock in Lots,

STOCKS AND SHARES IN THE
Barnet District Gas and Water Company,
Ventnor Gas and Water Company,
Lewes Gas Company,
Hertford Gas Company,
Aldershot Gas and Water Company, and
West Kent Gas Company.

Particulars of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C.

Crown 4to., Price 3s. 6d.

GASHOLDER AND TANK
(Of One Million Cubic Feet Capacity)
AT THE
SUTTON GAS-WORKS.
Designed and carried out by
F. SOUTHWELL CRIPPS, Assoc.M.Inst. C.E.
MEMBER OF THE INSTITUTION OF GAS ENGINEERS,
MEMBER OF THE SOCIETY OF ARTS,
CONSULTING ENGINEER.

EMBRACING NOTES ON GASHOLDER CONSTRUCTION GENERALLY.

REPRINT OF A SERIES OF ARTICLES IN THE "JOURNAL OF GAS LIGHTING," &c., WITH THE ACCOMPANYING PLATES.

Other Works by the same Author.

The Guide-Framing of Gasholders, and Strains on other Structures in Gas-Works	6s. 0d.
Gasholders With or Without Guide-Framing: A Discussion; and Literature on Gasholder Construction	1s. 0d.
Flow of Gas, and Proportioning Gas-Mains	7s. 6d.

PUBLISHED BY
WALTER KING, 11, Bolt Court, FLEET STREET, E.C.

BENZOL.

SPECIALLY prepared for Enriching Gas and PREVENTING THE STOPPAGE OF SERVICE-PIPES by the deposit of Naphthalene. Price 10d. per Gallon, free on rails at our Works in Drums (returnable).

Apply WHITWOOD CHEMICAL CO., Ltd., WHITWOOD COLLIERIES, Nr. NORMANTON.

INCANDESCENT GAS LIGHTING.

Incandescent Burners from **5/6 per doz.**

Specially annealed best Fireproof Glass Chimneys (equal to the Jena). 1/4 per Doz.

All other Incandescent Fittings at greatly reduced Prices.

Patentees of the "IMPROVED STANDARD GLOBE-CHIMNEY."

Best "Comet" Bulbs, 2/6 per Dozen.

Write for Illustrated Price Lists.

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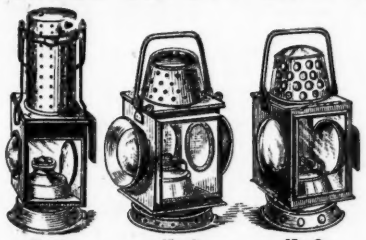

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effects a great saving of time, labour, and expense.

For Particulars, Price, &c., apply to Mr. EDWARD PRICE, 119, Queen's Road, FINSBURY PARK, N.

Prices are Reduced.

HEBBURN MAIN GAS COALS.

Yield of Gas per Ton . .	10,500 Cubic Feet.
Illuminating Power . . .	16·4 Candles.
Coke	68 per Cent.

For Prices, f.o.b. Ship or Delivered by Rail, apply to

The Wallsend & Hebburn Coal Company, Ltd.

8 Lombard Street, NEWCASTLE-ON-TYNE.

W. RICHARDSON, Fitter.

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FROM THE

MARQUIS OF LONDONDERRY'S COLLIERIES,

COUNTY OF DURHAM.

Available Output up to 5000 Tons per day. Yield of Gas 11,000 cubic feet per Ton of Coal as per Analysis by Mr. John Pattinson, F.C.S., F.I.S.

FOR PRICES AND PARTICULARS, APPLY TO

S. J. DITCHFIELD,

SEAHAM HARBOUR, COUNTY OF DURHAM.

"GAS, AND HOW TO USE IT."

A useful little Brochure, suitable for Distribution among Gas Consumers in the District of any Gas Company, and containing

USEFUL HINTS TO GAS CONSUMERS, A COMPARISON OF INCANDESCENT BURNERS WITH ELECTRIC LIGHT, &c.

BY

J. H. TROUGHTON.

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100, £2; 250, £4 10s.; 500, £7 10s.; 1000, £10.

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WITH

CHEAP BENZOL.

AT to-day's Price of Benzol, Illuminating POWER costs less than ONE-THIRD OF A PENNY PER CANDLE.

Apply to SADLER & CO., MIDDLESBROUGH.

DISPENSE WITH CANNEL COAL

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INCREASE YOUR ILLUMINATING POWER

by using the

WHESSOE-MUNICH BENZOL CARBURETTER

The Cheapest and Best in the Market.

The Managers of Tynemouth, Middlesbrough, and Darlington Gas-Works are much pleased with it, and would not be without it.

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ANALYSIS.

Yield of Gas per Ton. .	10,500 Cubic Feet.
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Coke	66·7 Coke.
Sulphur	0·86 Sulphur.
Ash	2·04 Ash.

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NOTE.—Makers of HORSLEY'S PATENT SYPHONS. These are cast in one piece, without Chaplets; doing away with Bolts, Nuts and Covers, and rendering Leakage impossible.

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PRICES REDUCED.

(THOMAS & SOMERVILLE'S PATENT)

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Illuminating Power . . .	16·9 Candles.
Coke (of good quality) . .	67·5 per Cent.
Sulphur	0·58 ,,
Ash	2·73 ,,

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For use in the

RECOVERY OF SULPHUR,

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Present Daily Produce over 5000 Tons.

Latest Analysis—By CHARLES PHILLIPS, Gas Examiner to Rotherham Corporation

Yield of Gas per Ton . . .	11,205 Cubic Feet.
Illuminating Power	$16\frac{7}{10}$ Stand. Sperm. Candl.
Coke (of good & pure quality)	$13\frac{3}{4}$ Cwt. per Ton.
Sulphur	A little over 1 per Cent.
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Tar	163 lbs. (Avoir.) per Ton.
Ammoniacal Liquor	103 lbs. (Avoir.) per Ton.

HOLMSIDE GAS COALS are supplied to the largest Gas Companies in England and on the European Continent; London alone consuming about half the produce.

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Present Daily Produce available 3000 Tons.

Of equal quality to the "Holmside" Coal, and also very largely used by many Gas Companies at Home and Abroad.

Both descriptions are shipped at Tyne Docks, and Dunston Staiths, River Tyne, also at North and South Docks, Sunderland.

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Awarded HIGHEST MEDAL and DIPLOMA at the Newcastle-on-Tyne Royal Mining and Industrial Exhibition, 1887, for

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Yield of Gas per ton	13,155 cub. ft.
Illuminating Power	38·22 candles
Coke per ton	1,301·88 lbs.

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Yield of Gas per ton	10,500 cub. ft.
Illuminating Power	17·8 candles.
Coke	70 per cent.

SOUTH PELAW MAIN GAS COAL.

Yield of Gas per ton	10,500 cub. ft.
Illuminating Power	16·3 candles.
Coke	73·1 per cent.

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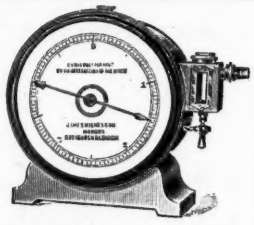

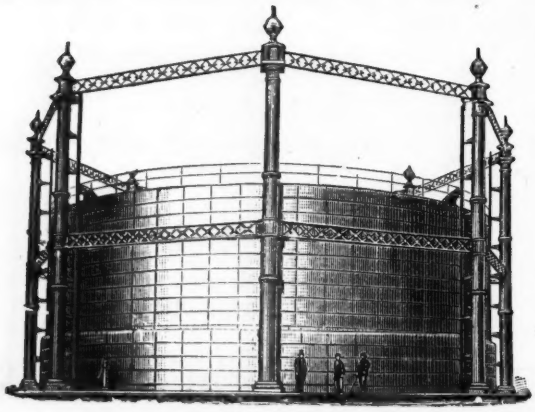

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Gas Companies are solicited to try Samples of the
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Prices and Analysis on application.
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HISLOP'S PATENT REGENERATIVE RETORT-SETTINGS

These Settings are Testified to and guaranteed to produce **more Gas per day,** to be more **simple** in **Management,** to have **greater Durability,** to be **more Economical** in **Labour** and **Fuel,** and to have the **Lowest Cost for Renewals** of any system in the Market. Gas Engineers and Managers would do well to give these advantages their careful consideration, when contemplating extension of their Retort-Benches, or when filling existing Ovens.

Further Particulars from the Principal Agent, or from C. M. HAMILTON, Retort Builder, Hamilton, Agent for Scotland & Ireland.

NOTE: **The Agency held by Messrs. Drake & Son, Halifax, for England, Wales, and Abroad has now ceased; and they have no authority whatever to represent the Patentee, although persistently advertising themselves as Agents.**

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Specially adapted for Siemens-Martin Gas-Furnaces; also for Gas, Copper, Iron, Steel, and other Furnaces where intense heat is required.

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ALL DEALERS AND THE PUBLIC ARE

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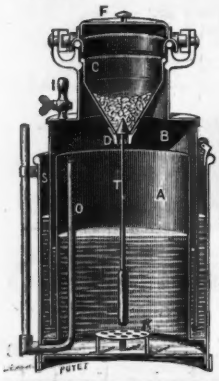

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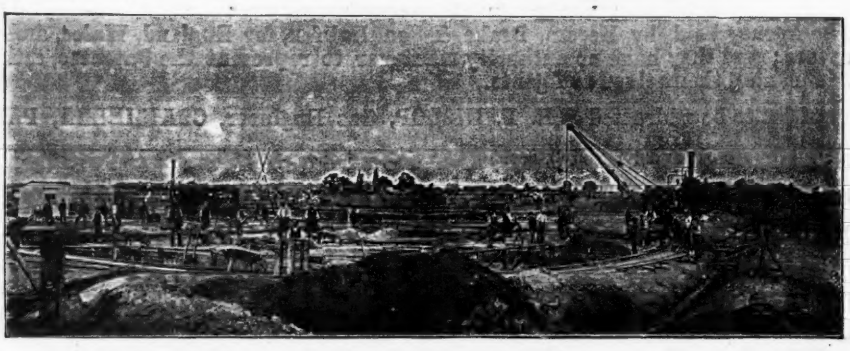

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For Carbonizing Advt. see last Issue.

H. KIRKHAM'S PATENT "IMPERIAL" WASHER-SCRUBBER.

TESTIMONIAL.

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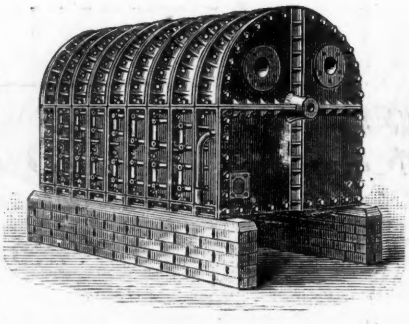
Dover, Feb. 8, 1899.

H. KIRKHAM, Esq.

Dear Sir,—Have now made further tests with the Washer fitted with your PATENT WASHING DEVICES, and have much pleasure in reporting that *the results were highly satisfactory*; also, I ascertained that the maximum results were obtained when the machine was working at three revolutions per minute. At this speed 13 to 14 gallons of water per ton of coal carbonized were converted into 10-oz. Ammoniacal Liquor, and at same time the Gas was free from Ammonia.

Should you wish further details, I will forward them.

I am, dear Sir, yours truly,
RAPHAEL HERRING, Engineer.



EFFICIENCY GUARANTEED.

Estimates given for a complete set of Segments for one wheel, or for refitting the whole number of wheels in a machine, also for Washer-Scrubbers complete.

The Scrubbing Devices are metal scrolls fixed in cages of segmental form, which can be readily and successively removed from the wheels through a manhole on the top or side of the machine, and the enclosed Scrubbing Devices taken out, cleaned, and replaced without the delay that necessarily takes place when the entire scrubbing material of the whole wheel has to be dealt with in one operation—thus effecting an important saving in time and labour. These Cages can be applied to the wheels of any machines of the type shown, and will increase their efficiency above 20 per cent.

The Scrubbing Devices are unequalled for extracting the whole of the Ammonia and a very large proportion of the Carbonic Acid and Sulphuretted Hydrogen from the Gas; and, if required, the strength of the Ammoniacal Liquor can be worked up to 30 oz. and above, which greatly reduces the quantity of Oxide or Lime, and also the amount of Labour for Purification.

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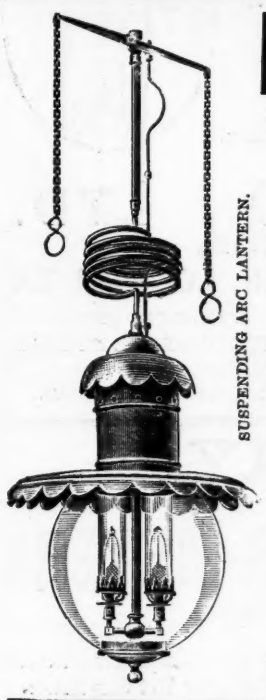

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INCANDESCENT GAS LIGHTING

The disastrous effects of SHOCKS and VIBRATIONS may now be done away with by the use of

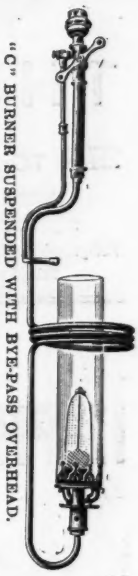
CLAY'S PATENT SHOCK-PROOF FITTINGS,

which are the next best thing to UNBREAKABLE MANTLES.

The Illustrations show two of our arrangements; but we are able to cope with all conceivable conditions or requirements.

WRITE FOR OUR ILLUSTRATED CATALOGUE WITH FURTHER INFORMATION.

WARNING: As we hold the Master Patents covering the COILING OF SUPPLY-PIPES to obtain a resilient bearing to neutralize the damaging effect of Shock or Vibration on the Mantles of Incandescent Burners, we shall not hesitate to immediately INSTITUTE PROCEEDINGS AGAINST ANYONE INFRINGING OUR RIGHTS.



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Telegrams: "CLAYS, BOLTON." See "Journal," Dec. 13, 1898, p. 1358, & Jan. 17, 1899, p. 130.

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RETORT SETTERS.
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— FOR —

ENGLAND, WALES & ABROAD.

RETORT BENCHES ERECTED COMPLETE WITH OR WITHOUT SPECIAL FURNACES.

RESULTS GUARANTEED.

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ESTABLISHED 1844. **ORIGINAL MAKERS.** ESTABLISHED 1844.

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The latter being the Highest Award for Dry Gas-Meters at the Paris Exhibition, 1867. Since then we have not Exhibited FOR PRIZES.

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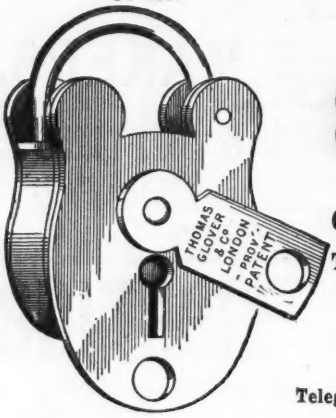

THOMAS GLOVER & CO.'S

PATENT

SECURE PADLOCK

PREVENTS TAMPERING WITH THE

CASH-BOXES OF PREPAYMENT METERS.

The Padlock is Sealed by means of a Lead Eyelet, which is impressed with Company's private mark. Eyelets easily fixed and removed by Company's Collector.

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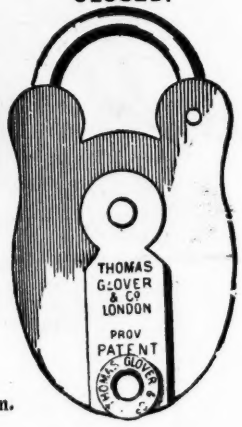

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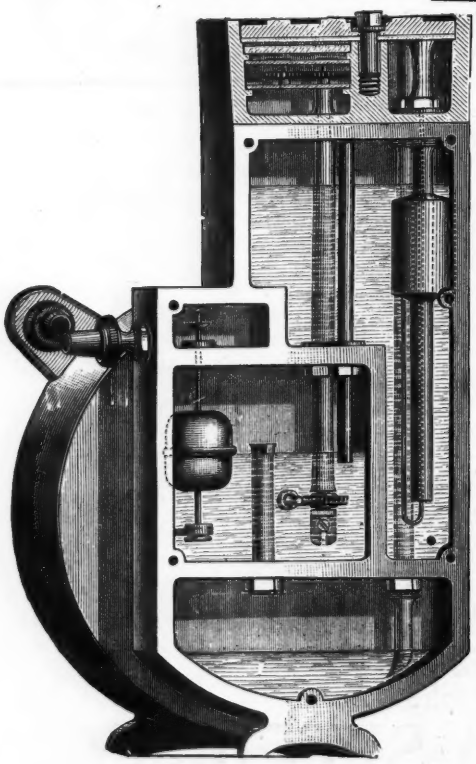

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Has been designed to obviate that which has hitherto prevented the general adoption of underground Meters—namely, their serious cost. No box is required; and the saving thus effected as compared with ordinary underground Meters, where either a box or meter-pillar is necessary, is fully one-half. The price of one for three lights is 28s.; and the other sizes are correspondingly cheap. When fixed, the only part of the Meter exposed to view measures 6½ inches by 3½ inches. By the Indicator with which the Meter is fitted, the Inspector can at once discern whether water is required; but as the Meter is of the compensating description, water will probably need only be supplied ONCE A YEAR. It is advisable to fill the Meter with a non-freezing liquid which does not injure the fittings; and this can be supplied at about 1s. 8d. per gallon.

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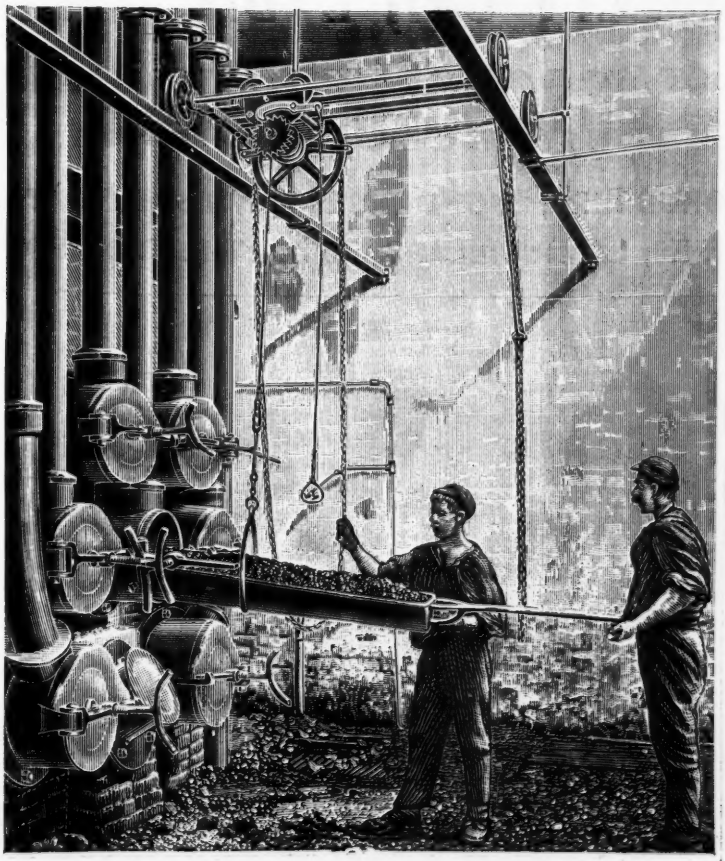

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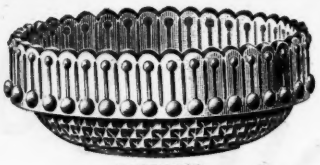

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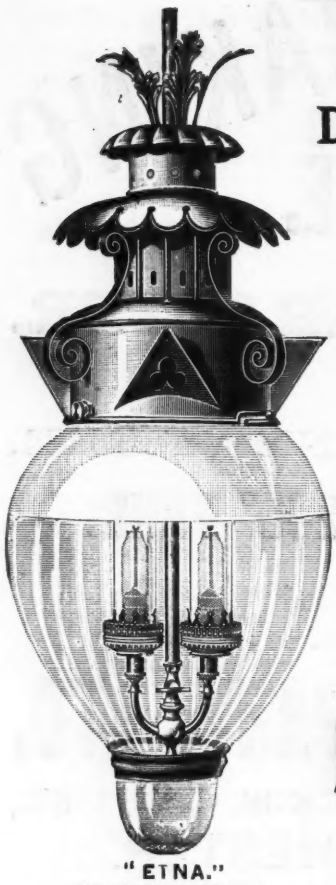

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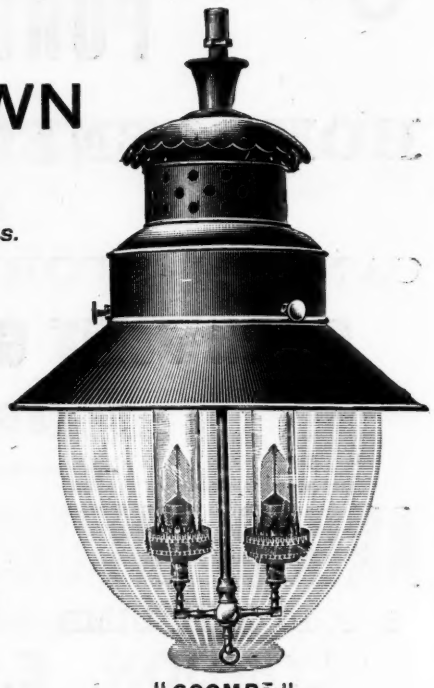

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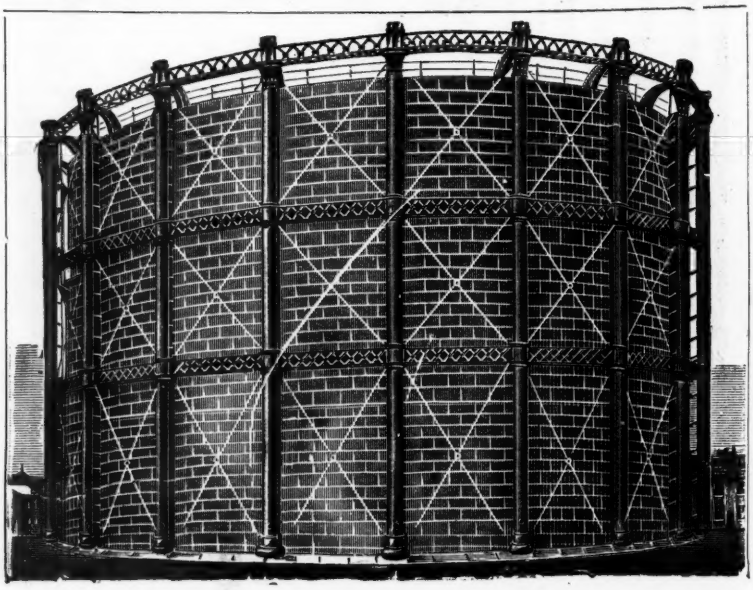

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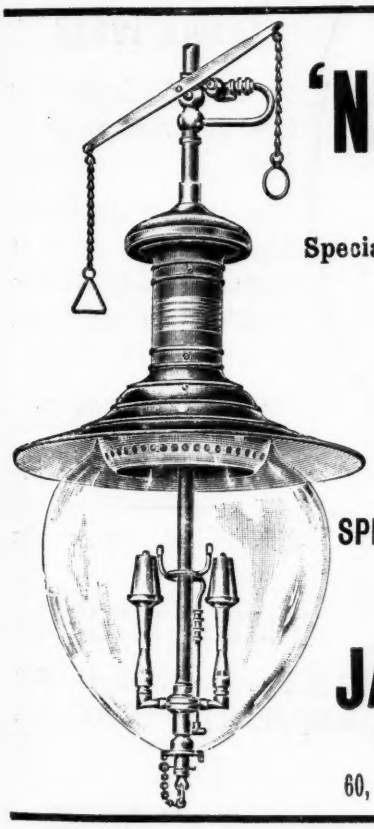

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Specially constructed for use with the New Welsbach Chimneyless Burner.
Made with lever and chains, or with cock at bottom.
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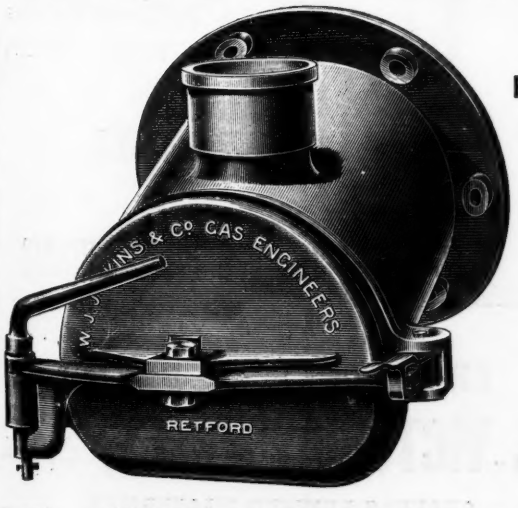

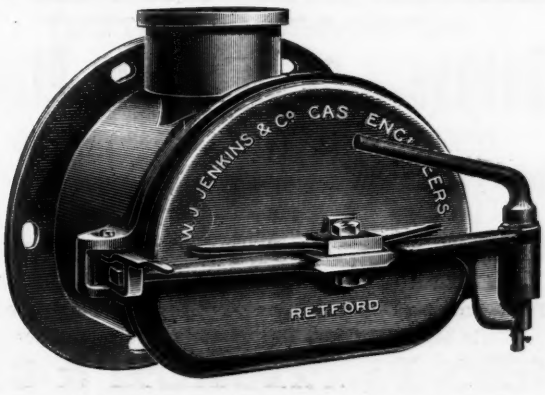

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Have confidence in drawing the special attention of GAS ENGINEERS to the following advantages of their Retorts:—

1. Smooth interior, preventing adhesion of Carbon.
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MACHINE-MADE GAS-RETORTS.

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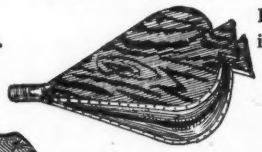
Manufacturer of

Bellows for Inflating Gas-Bags. Made in various sizes.



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Special Air Tubing made for Gas Companies.

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RETORTS CAREFULLY PACKED FOR EXPORT.
Fire-Bricks, Lumps, Tiles, &c., &c., of every description suitable for Gas-Works.

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Manufacturers of
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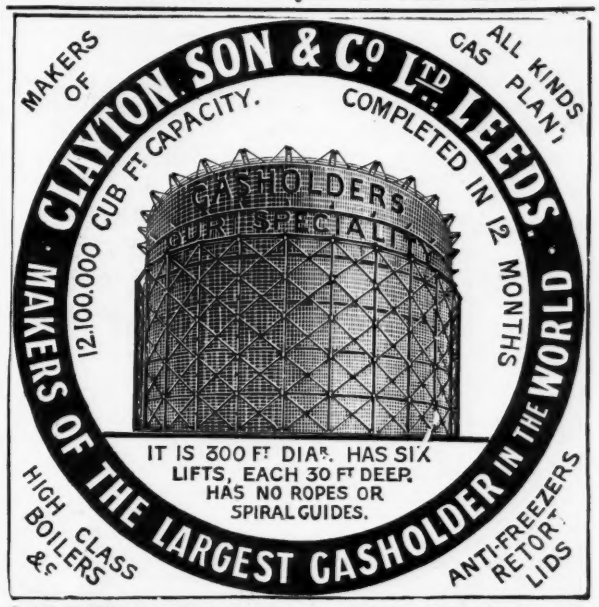
UNSURPASSED FOR QUALITY AND VALUE.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SPECIALITY
MAKERS OF THE LARGEST GASHOLDER IN THE WORLD
IT IS 300 FT DIAR. HAS SIX LIFTS, EACH 30 FT DEEP. HAS NO ROPES OR SPIRAL GUIDES.
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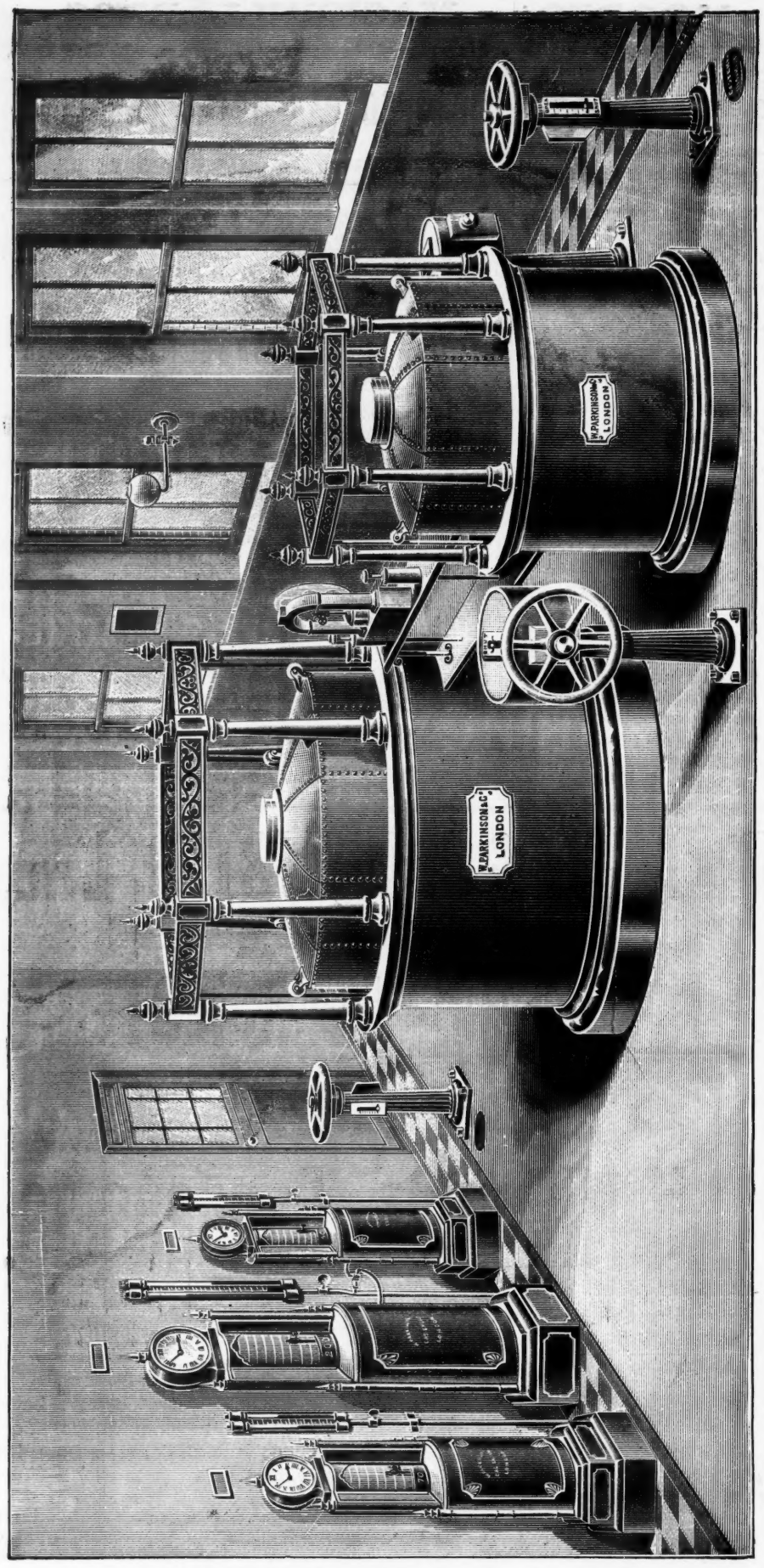

EQUILIBRIUM GOVERNORS. THE GASLIGHT AND COKE COMPANY'S VALVE-ROOM, STOKE NEWINGTON.

(TESTIMONIAL.)

THE GASLIGHT AND COKE COMPANY, 146, *Goswell Road, E.C., Jan.* 5, 1898.

GENTLEMEN,—In reply to your inquiry as to the working of the 36-inch and 24-inch Governors (double cone and equilibrium) recently erected by you at the new Valve-Station of this Company, situated at Stoke Newington, I beg to inform you they are highly satisfactory in their working.

The gas governed is supplied through a high-pressure pumping-main; and, notwithstanding the great fluctuations in the initial pressure, owing to so many stations pumping and shutting off alternately, the construction of your Governors enables a perfect equilibrium to be maintained, and being acted upon themselves by outlet pressure only, they stand the most severe test to perfection.

I shall be happy to answer any questions, or show the Governors to Engineers contemplating their erection.

I am, Gentlemen, Yours faithfully,

MESSRS. W. PARKINSON AND CO., (Signed) G. F. L. FOULGER, Distributing Engineer.
Cottage Lane, City Road, E.C.

W. PARKINSON & CO., LONDON, BIRMINGHAM.

[See also Advt., p. 572.

LONDON: Printed by WALTER KING (at the Office of King, Sell, and Railton, Ltd., 12, Gough Square); and published by him at 11, Bolt Court, Fleet Street, in the City of London.—Tuesday, March 7, 1899.